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A COMPREHENSIVE PLAN AND

COASTAL MANAGEMENT PROGRAM FOR

THE CITY AND BOROUGH OF JUNEAU, ALASKA

VOLUME II - TECHNICAL APPENDIX

This document is a draft. It is a companion to Volume I, which contains the Policies and Implementing Actions of the Comprehensive Plan and Coastal Management Program. In its draft form, it is being distributed to appropriate individuals and agencies for technical review.

Prepared By COGAN/SHAPIRO

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TECHNICAL APPENDIX

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Section I

Introduction

I. INTRODUCTION

The information and analysis in this volume provides factual support for the Findings, Policies, and Implementing actions of Volume I. Adequate data is fundamental to deriving reasonable and consistent policies within the framework of an effective comprehensive plan.

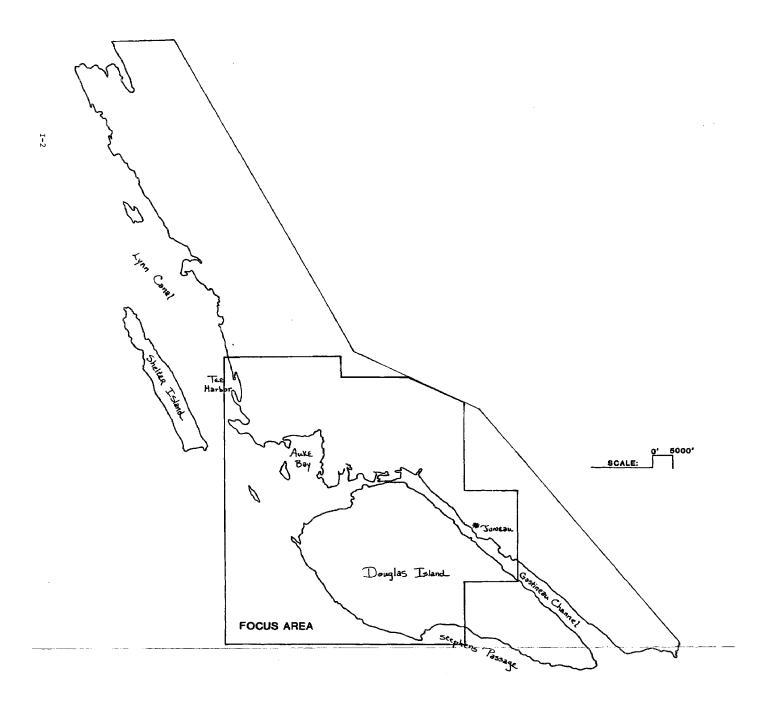
In addition to its function as a foundation for the comprehensive plan, the Technical Appendix can be used as a reference for public and private users involved in planning, development and management of the land, resources, and facilities of the CBJ.

Although many studies of natural and manmade characteristics of the Juneau area have been completed over the years, some have fallen into disuse because they were intended for a single purpose or because they were not connected to policies or implementing actions. Applicable and relevant information in those documents, particularly in regard to natural resources and development activities, have been incorporated into this document and are identified in the References section of the Technical Appendix.

Other information, particularly in the sections concerned with land use, public facilities and services, and vegetation, was gathered specifically for this planning effort. The analysis combined work by the consultants with analysis contained in other reports. Reference is made in each section to methodology and sources of information and analysis.

Maps presented in the Technical Appendix are substantially reduced from their original scales. Base maps include the Study Area and Focus Area (Figure I-1) and individual focus areas. The respective scales of the original maps are 1:63,000; 1:36,00; and 1:15,000. The scale at which specific data was mappped is in relation to the area covered, the scale of the data, and its eventual use. Copies of the original maps can be obtained from the Planning Department of the CBJ.

STUDY AREA AND FOCUS AREA



COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

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Section II

Topography

II. TOPOGRAPHY

INTRODUCTION

Southeast Alaska is an area characterized by rugged relief. Steep forested slopes rise from tidewater to snowclad peaks; glaciers flow into narrow stream valleys from ice fields, sometimes reaching the sea; and waterfalls descend from thousands of feet. The area is dotted with many mountainous islands and interconnecting waterways. Some islands cover many hundreds of square miles while others, only a few acres. Typically, mountain slopes are steep and valleys are narrow, with areas of low flat land limited to several square miles.

Biophysical boundaries were established for the Alaska coastal zone by the Alaska Department of Fish and Game in 1978. The boundaries identify and define the landward and seaward limits of coastal physical and biological processes. The coastal boundaries are subdivided into three zones, each reflecting the degree of coastal interaction, and are defined as direct interaction, direct influence, and indirect influence.

Within the area of the CBJ, the zone of direct interaction includes all the marine waters of Lynn Canal and Stephens Passage, and extends landward to the region of bald eagle nesting, the extent of active coastal erosion, saltwater intrusion and tidal influence of the Mendenhall and Lemon Creek wetlands, and includes the CBJ to the 600-foot contour. The zone of direct influence is defined by the Sitka spruce-hemlock forest and extends from the landward edge of direct interaction to about the 2,500 foot contour. This zone includes freshwater systems where anadromous fish spawning and overwintering occurs. zone of indirect influence extends landward to the regional snowline, or the average lower limit on glaciers of year round snow cover. This boundary is approximately 3,500 feet on the Herbert Glacier. Human activities in this zone may have a direct impact on coastal processes. The seaward limits of the zone of indirect and direct influence includes the zone of direct interaction, or all marine waters.

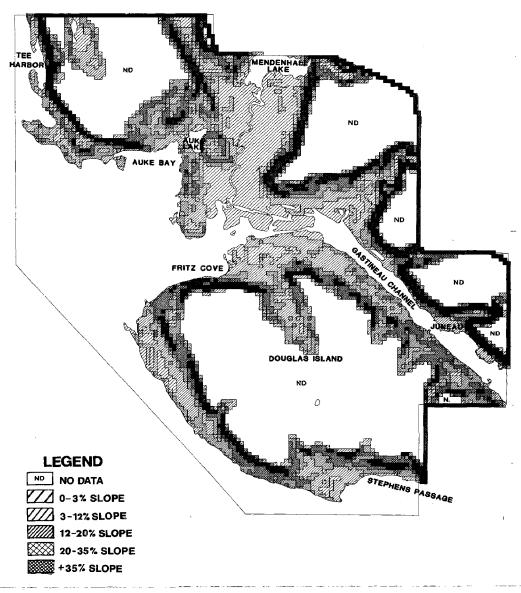
The topography of the Juneau area consists of adolescent rugged mountain ranges that have been deeply bisected by river erosion and modified by glacial action. Downtown Juneau is located at the mouth of Gold Creek on the Gastineau Channel. Mount Juneau and Mount Roberts, which rise abruptly to over 3,500 feet on the mainland, and the steep slopes of Douglas Island, give an almost tunnel-like appearance to the straight and narrow Gastineau Channel.

Some of the topographic features and geologic deposits indicate that the position of the land relative to the sea has changed greatly during the past 10 to 20 thousand years in the Juneau area. At present, the land is emerging and the change in land levels may be caused by one or more conditions. World-wide (eustatic) sea level changes occur from expansion and contraction of glaciers. Relative sea level changes exceeding 400 feet have been noted. The loss of the weight of glacial ice as it receeds also allows the land to rebound. Other major causes for relative sea level changes are tectonic uplifts of the land resulting from stresses between the North American Continent and the adjacent Pacific Ocean. Sudden tectonic uplifts of large areas of land is evident from the Alaska earthquake of 1964. Tectonic forces have been affecting Southeast Alaska for over the past 2-3 million years. In the Juneau area, marine fossils occur in glaciomarine deposits at an elevation of 750 feet above present sea level. Twenhofel (1952) notes that the Juneau area has undergone the greatest relative uplift in Southeast Alaska since glacial times.

The Mendenhall Valley and the tide flats around the airport and lower Lemon Creek are essentially the only flat ground in the Juneau area and are rapidly being converted to urban land use because they are easy to develop.

The steep topographic relief in the Juneau area is a major limiting factor for urban development. Resource data and analysis for the study area was compiled on standard U.S. Geological Survey Topographic Quadrangle maps, 15-minute series. The locations of shorelines and glacial terminus has been corrected by using 1979 color infrared aerial photographs. Significant changes in the coastal zone can be noted in the airport-Mendenhall River delta area and Eagle Creek delta. Recession of glacier terminus for the Mendenhall, Herbert, and Eagle glaciers has been more than 2,000 feet over the past 20 years. The contour interval on the USGS maps is 100 feet. A slope grid map was developed for the study areas below the 1,000-foot elevation (Figure II-1). This elevation was selected as a reasonable limit of urban development for the near future, other than special use areas such as Eagle Crest.

Slope categories using the Soil Conservation Service classification (Schoephorster & Furbush, 1974) are used to evaluate development limitations alone or in combination with other geologic hazards. The susceptibility of most soils to erosion, and the hazards of landslide and avalanches are directly proportional to steepness of slope. Steep slopes also can limit urban development, due to restrictions on septic drain fields, roads, and utilities.



SCALE: 5000

Computer Mapping Analysis by Comarc Systems, San Fransisco, CA

Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA



DEVELOPMENT CONSIDERATIONS

There are several potential hazards inherent in developing on steep slopes. Certain soil types are less favorable for development than others (Section III, Earth Resources). Slopes over 20% require detailed geotechnical site investigations and special construction techniques. Those exceeding 35% should be considered non-developable unless site-specific studies indicate that the significant natural hazards can be overcome through special design and construction.

Section III

Earth Resources

III. EARTH RESOURCES

INTRODUCTION

Geology is the study of the physical features of a land form and the processes that are responsible for the building up and wearing down of mountains and other natural formations. The major processes that have shaped the Juneau area are tectonics and weathering. Tectonics includes mountain building processes by uplifting, folding, and faulting of the rock strata. Weathering is a wearing away of the rock by glacial action, landslides, and erosion.

Geologic formations and surficial deposits (soils) have certain limitations which must be considered in land development. These limitations include soil characteristics, potential natural hazards, and resources. This section presents a background discussion on the bedrock geology of the area; a description of the soils and their development limitations; a discussion of natural hazards, including seismic, landslide-avalanche, and flood zones; a review of mineral resources; and a summary of how these factors can influence land use decisions.

Soils are the result of weathering and erosion of geologic materials. Factors that influence their formation are time, climate, and character of parent material, including slope. The degree of limitation for urban development is dependent on factors such as density, texture, and depth, particularly the groundwater table. These characteristics also influence the behavior of ground response during an earthquake. Earthquakes can cause ground fracturing, water or sediment ejection, and settlement, liquefaction, and possible landslides. Landslide susceptibility is dependent largely on slope and soil characteristics. Bedrock fracture patterns determine susceptibility to rock fall avalanches and can result in exposed steep mountain slopes where snowslide avalanches may be generated. Stream bank flooding occurs primarily during heavy fall rainstorms and when stream discharge is high from glacial melt. Coastal flooding can occur as a result of high tides combined with storm conditions or from sea floor disturbances during an earthquake. Sand and gravel and mineral resources occur only in specific localities. These physical constraints are analyzed with regard to requirements for land use planning.

GEOLOGY

The geology of the area consists of Tertiary to Late Paleozoic metamorphic and plutonic rocks and surficial Quaternary glacial and alluvial deposits. This section presents a brief overview of the bedrock geology. The surficial deposits are described in the

following subsection with regard to the soils that have formed on them.

The rock units of southeastern Alaska are generally arranged in three bands of distinct types that trend northwest, roughly paralleling the coast. The Coast Mountains east of the study area are comprised of the Coast Range granitics. This granitic batholith is bordered on the west by a band of injection gneiss, which is approximately a few miles wide (Plafker, 1962, p. 127). To the west of the gneiss belt, which includes most of the study area, is the third belt of metamorphic rocks. These rocks generally grade from schist on the east to slate and graywacke on the west. Some volcanics, variously altered to greenstone, are located within the slate and graywacke band.

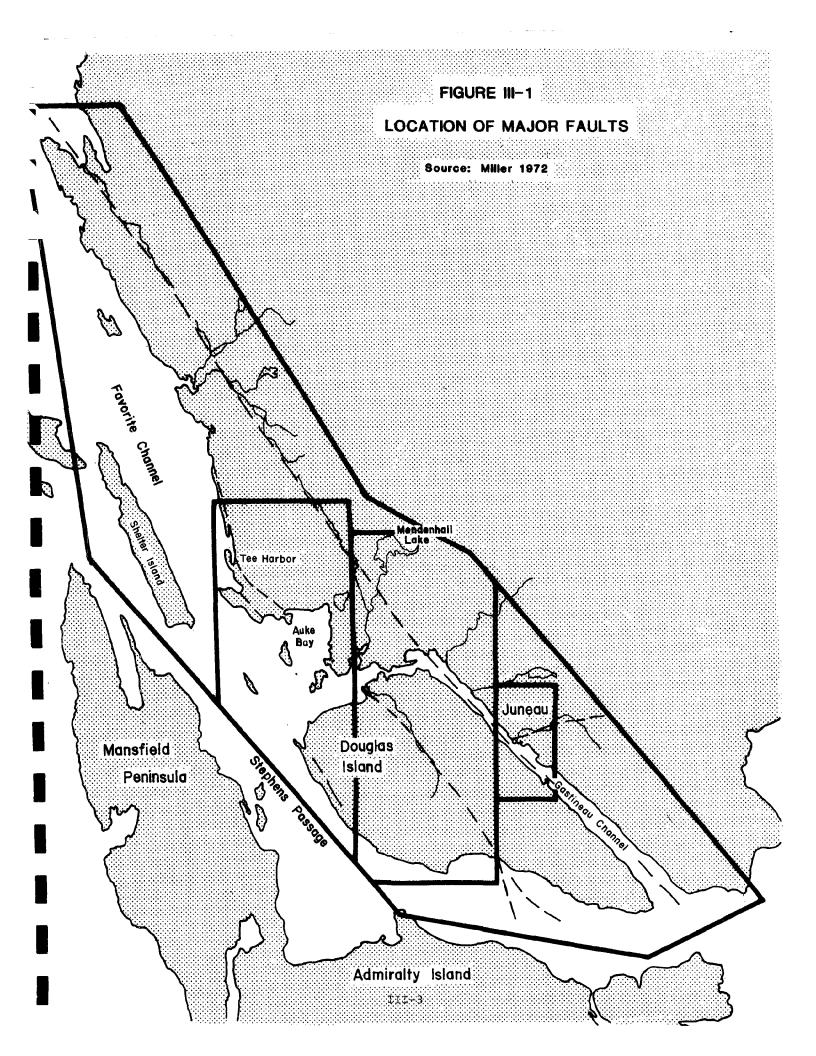
Rocks of the region have been metamorphosed and moved both by the intrusion of the Coast Range granitics and by other tectonic stress. Recrystallization of rock constituents, complex folding, and mixing of rock types increases toward the batholith. Folding and refolding occur at many scales and confuse bedding determination. Overall, however, bedding dips steeply to the northeast, becoming steeper nearer the granitic batholith (Buddington and Chapin, 1929, p. 292). Some chunks of the metamorphic suite are found within the batholith, and small granitic bodies liberally intrude the metomorphic rocks. The gold belt is contained in the mineralized zones within the metamorphic rocks adjacent to the granitics.

The foliation or strike of the bedding in the layered rock parallels the trend of the Gastineau Channel. These planar rock features project or dip northeastward into the mountainside at 30 to 75 degrees. Superimposed over the bedrock foliation are two joint sets which dip to the northwest and southwest, and break the bedrock into large blocks; they can become loosened and slide and fall off steep slopes.

Several major faults are mapped in the study area (Figure III-1). A northwest-trending fault is mapped from north of Berner's Bay and follows the alignment of Cowee and Montana Creeks to the Mendenhall Valley, continuing down Gastineau Channel. The easterlytrending Silverbow fault is mapped just north of Juneau and Sheep Mountain, entering Taku Inlet just south of Sunny Cove (Plafker, 1962, page 133). These faults postdate the metamorphic rocks, some of the granitics, and mineralization. Refer to Seismic Hazards for further discussion on faults and seismicity.

Summary

The bedrock characteristics of the area can influence land use development decisions with regard to resource extraction landslide and avalanche zones. Resource commodities include metallic minerals and rock for construction purposes. The increase in the number of filed mining claims as a result of higher values for gold and silver could produce a new economic base for the area.



Geologic resources are further described in the Mineral Resources subsection.

The structural characteristics of the bedrock influence the stability of the mountain slopes and the potential land use at the base of the mountain. Several steep slope areas along the Thane-Juneau Road, Gold Creek, the west slope of Thunder Mountain, and Fish Creek Valley on Douglas Island are the source for large rubble rock piles and talus slopes at the foot of the mountain.

SOILS

As a means of identifying different soil types and describing their characteristics, the U.S. Soil Conservation Service (SCS) has developed a classification system based primarily on the parent material, texture, and slope of the soil. Although initially developed to assess the agricultural capability and erodability of the soil, the system has been expanded to describe other attributes, such as resource value, urban development limitations, and woodland suitability.

A soil survey of the CBJ was conducted by the U.S. Soil Conservation Service (Schoephorster and Furbush, 1974) with assistance from the City and Borough of Juneau and the U.S. Forest Service. The soils are described in this report as soil associations within the overall study area, and as soil series within the focus areas. Because of limited agricultural activities within the area, soil properties are described in terms of engineering uses and urban development limitations, such as foundations for small buildings, septic drainfield suitability, and construction and maintenance of roads and buried pipes.

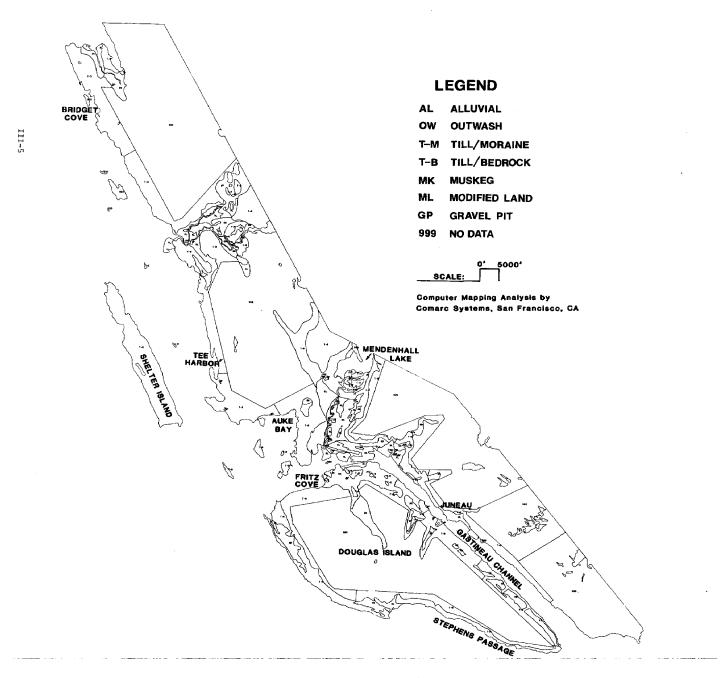
Soil Associations

A soil association is a group of soil types consisting of one or more major soils and at least one minor soil that have formed on a particular landform distinctive of the geographic area. A generalized soil association map for this study area is shown as Figure III-2. Soil associations in the Juneau area include alluvial and outwash soils, upland soils formed in glacial till, and peaty soils or muskegs. A brief description of these soil associations and the landforms on which they developed follows.

Alluvial soils occur on the flood plains of the major river and stream valleys; they include silty and sandy alluvial soils and gravelly sandy outwash soils. The silty soils are characterized as very poorly drained; they have developed on low-lying, nearly level alluvial plains under mosses, sedges, and grasses, with patches of willow and alder. Stunted hemlock and spruce occur in better drained sandy alluvial soils. Included are areas of moderately deep peat, which are 20 to 50 inches thick. The water table is generally less than one foot below the surface, and

STUDY AREA

SOIL ASSOCIATIONS



Full-size copies of this map are available at the CBJ Planning Department.

these soils are subject to periodic flooding. The West Mendenhall Valley consists of fine grained alluvial soils.

The gravelly soils consist of excessively drained soils that occur in outwash plains, terraces, and undulating to hilly moraines; these soils support hemlock and spruce forest. The water table is more than 4 feet below the surface. These soils are rarely flooded except during exceptionally high water or in low-lying areas, and are found primarily in the Herbert-Eagle River and East Mendenhall Valleys.

Most of the uplands consist of soils formed in glacial stony till that ranges from a few inches to many feet in thickness over bedrock. Bedrock outcrops and rocky cliffs are common. These soils vary from moderately well-drained very gravelly till to poorly-drained dense till with impermeable substratum. On benches and footslopes many of the soils are poorly drained due to the firm, compact slowly permeable or impermeable subsoil. These areas commonly include deep mucky peat soils and muskegs. A perched water table is usually very near the surface. Soils with granular subsurface materials are moderately well drained and support Sitka spruce and western hemlock forest. The Mendenhall Peninsula contains a typical assemblage of these soils.

Peat soils (muskegs) occur on the uplands, on benches and footslopes, and in alluvial valleys; they are very poorly drained and have water tables near the surface. The peat materials, which are in various stages of decomposition, are derived from mosses, sedges, and woody vegetation. Thickness of the peat ranges from about 2-3 feet to greater than 10 feet in some locations. These soils support a variety of vegetation types from sphagnum moss with scattered lodgepole pine to hemlock and spruce forest on shallow peat soils. North Douglas Island has an abundance of deep upland peat soils and the lower Peterson Creek-Salt Lake area consists of alluvial peat soils.

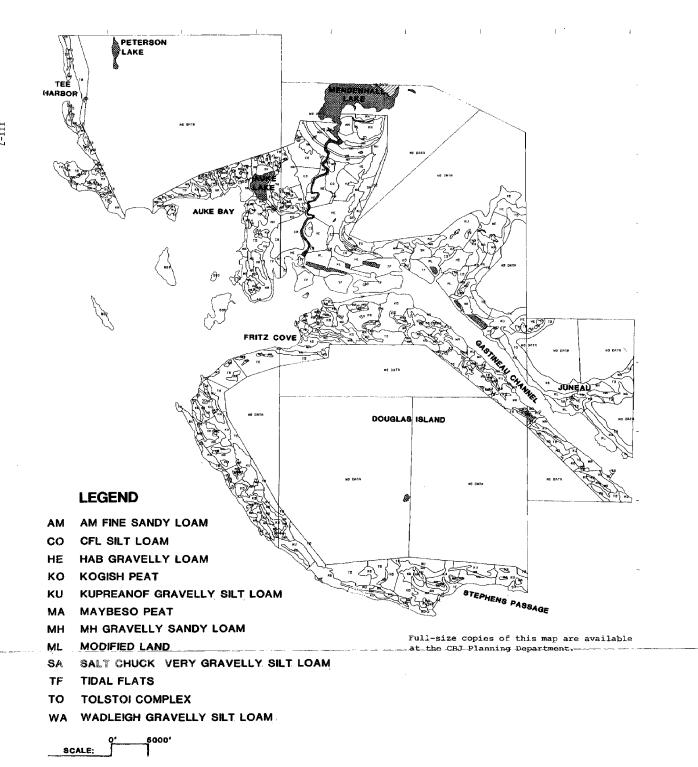
Soil Series Groups

Soil series are mappable soils which have developed from a particular type of parent material and have distinctive characteristics and arrangement of the soil profile. Those mapped by the Soil Conservation Service in the Juneau area include 21 soil series and land types. These soils have been assembled into 12 soil series groups which have similar physical and engineering characteristics and development limitations or constraints. Their location and distribution are shown on the soil series map for the focus areas (Figure III-3).

The mapped soil series groups may contain one or more associated soil series within the mapped boundaries. For example, Kogish peat may be included within Wadleigh soils. The soils map is not intended for detailed site-specific development considerations since slight variations in characteristics can be expected. Because SCS data are more generalized, specific geotechnical

FOCUS AREA

SOIL SERIES



Computer Mapping Analysis by Comarc Systems, San Fransisco, CA

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evaluations of on-site soils should be made when development is considered. Descriptions of the soil series groups with a discussion on site development limitations follow.

The degree and kind of SCS soil limitations for urban development are intended to serve as a guide to the planning process. A slight limitation indicates that the soil properties are generally favorable for the specified use and that the limitations are minor and easily overcome. A moderate limitation indicates that the soil and site features have some unfavorable characteristics which can be overcome or minimized by special planning or engineering design. A severe limitation indicates that the soil or site properties are sufficiently unfavorable to require a major increase in construction effort, special design, or intensive maintenance. A rating of severe for a particular area does not mean that the soil cannot be used at all. It does mean, however, that for development purposes limitations must be considered. For example, specific control measures can reduce the potential erosion hazard, and suitable structural fill can be used to develop building sites in areas where native soils are unsuitable for direct building support.

Am Fine Sandy Loam (Am)

The Am series is formed in silty alluvial soils in broad valleys of the Herbert and Eagle Rivers (Figure III-2) and includes several small patches in the northern portion of the Mendenhall Valley (Figure III-3). These soils also occur on gently sloping alluvial fans along the eastern slopes of the Mendenhall Valley. The Am series soils are somewhat poorly drained. The valley areas include small streams, sloughs, and wet sandy and gravelly spots, and springs and seeps occur in the alluvial fans. These soils may be subject to overflow during periods of snowmelt or heavy rainfall. The water table is generally less than 2 feet below the ground surface. This soil is SM or ML in the Unified Soil Classificaiton System.

Am series soils severely limit development for septic drainfields and building foundations, due to the high groundwater table and susceptibility to flooding. Development in these areas requires drainage control measures and/or fill to compress the underlying soil and elevate the site to avoid flood hazards.

CFL Silt Loam (Co)

This group consists of Co, Fu, and Le silt loam and peat soils as mapped by the SCS. They consist of very poorly to poorly drained silty and organic soils that occur in level floodplains. They have formed in West Mendenhall Valley south of Glacier Highway and north of Montana Creek, in lower Lemon Creek Valley, and in the Salt Lake-Eagle Harbor area. The water table is generally at or less than I foot below the ground surface and very susceptible to flooding. Peaty soils range from 20 to 50 inches in thickness but may consist of thin seams in silty soils. These soils con-

sist of ML and PT in the Unified Soil Classification System. These soils have very severe development limitations for foundations, septic drainfields and shallow excavations due to their soft, highly compressible nature, the high groundwater table, and the hazard of flooding.

HAB Gravelly Loam (He)

This group consists of He fine sandy loam, Au very gravelly sandy loam, and Be very gravelly sand. These are well to excessively well drained soils that have formed in gravelly outwash material and elevated sandy terraces. These soils occupy the eastern portion of the Mendenhall Valley and the outwash terraces of the Herbert and Eagle River valleys. The substratum is composed of gravel and cobblestone, which make up 50 to 75% by volume of the soil. These soils are primarily classified GW, GP, and GM in the Unified Soil Classification System, but also contain SM or ML soils. The ground water table is generally greater than 4 feet below the surface, but may be near the surface in isolated low spots.

The HAB group is a good source of sand and gravel products and is well suited as a source of road fill; however, there may be excessive fines in the He soils that limit its suitability for those uses. Shallow excavations for utilities or basements may be difficult, due to the presence of coarse materials. Limitations for septic drainfields is slight; however, flood hazards and high permeability of the soil could contaminate groundwater.

Kogish Peat (Ko)

This mapping unit includes Kaikli mucky peat (Ka) and Kina peat (Ki) soils that have formed from sphagnum mosses, sedges and decaying woody vegetation. These peat soils occur on broad benches and foot slopes of the uplands. The broad muskeg areas of North Douglas Island consist of deep Kogish and Kina peat soils. The peat is generally greater than 5 feet thick and may exceed 10 feet in some areas (Miller, 1972). The Kaikli series consists of shallow mucky peat over bedrock. Depth to bedrock ranges from 16 to 40 inches. Unified Soil Classification is predominantly PT, although some GM gravelly mixtures may be present.

These soils have very severe development limitations for septic systems, roads and foundations, due to their soft and compressible organic nature, the high water table, and the shallow depth to bedrock for the Kaikli series. Development in these areas requires removal of peat soil and drainage control, or pilesupported building foundations, and/or fill to compact the subsurface soils.

Kupreanof Gravelly Silt Loam (Ku)

This mapping unit includes Karta silt loam (Kt). The series consists of well drained soils that have formed in very gravelly loamy till in the uplands. These soils are most extensive along west Douglas Island, and also occur in upper Lemon Creek Valley. The substratum ranges in texture from very gravelly to gravelly sandy loam (ML and GM in the Unified Soil Classification System). Stones and boulders are common. Depth to seasonally high water table is generally greater than 5 feet.

Areas with low to moderate slopes of less than 12% have slight to moderate development limitations for roads, foundations, and septic systems. Steeper slope areas have potential slide and slippage hazards and are not suited for septic drainfields. Shallow excavations are severely limited by coarse material in the subsurface.

Maybeso Peat (Ma)

The Maybeso series consists of very poorly drained mucky peat soils which are from 16 to 50 inches thick over glacial till. They occur on nearly level to sloping land surfaces on upland benches throughout the study area. This soil is generally less thick than Kogish peat (Ko). The ground water is perched above a compact substratum and seeps on sloping areas are common. Depth to seasonal high water is less than 2 feet. This series includes patches of Wadleigh, Kina and Kaikli soils. These soils are classified PT and GM in the Unified Soil Classification System. These soils have severe to very severe development limitations for foundations, shallow excavations, roads, and septic filter fields due to the high water table, organic soils and coarse materials in the substratum.

Mh Gravelly Sandy Loam (Mh)

The Mh series consists of well drained soils that occur on the low hilly moraines of the Mendenhall, Herbert and Eagle glaciers. The texture of the subsurface material varies from coarse sandy loam to gravelly silt loam (GM in the Unified Soil Classification System). The slopes are short and irregular and contain ponded depressions of fine sandy soils.

Development limitations are slight to moderate for foundations, septic drainfields and shallow excavations. These soils are a suitable source for road fill, and sand and gravel. Excessive fines may require separation for aggregate processing.

Modified Land (Ml)

Modified land includes those areas which have been filled with coarse granular material of several feet to accommodate industrial, commercial, and residential uses. These areas include the downtown Juneau waterfront, the former tidal flats of lower Lemon

Creek, and the airport fill area. Mine waste dumps are also included in this category. Development constraints are highly variable due to the source and method of fill placement. Site preparation work is commonly required for building foundations.

Salt Chuck (Sa)

The Salt Chuck series consists of well drained very gravelly soils (GP-GM in the Unified Soil Classification System) that have formed in alluvial fans along the eastern Mendenhall Valley and north of Auke Lake. The water table is generally greater than 4 feet below the surface. The moderately sloping soils may be susceptible to overflow from streams during periods of melting snow or heavy rainstorms. Development limitations for roads, foundations, and septic systems are slight. Shallow excavations are severely limited due to the presence of coarse material in the subsurface. These soils are suitable for use as a source of road fill and sand and gravel.

Tidal Flats (Tf)

Tidal flats consists of nearly level areas in the Gastineau Channel area at the mouths of Salmon and Lemon Creeks and the Mendenhall River and are inundated by high tides. The substratum consists of silty to sandy material, but in some places they may be gravelly.

Tolstoi Complex (To)

This mapping unit includes the Tolstoi and McGilvery soil series. These soils consist of thin silt loam to stony sandy loam or forest litter that rest directly on bedrock (ML or PT in the Unified Soil Classification System). The depth to bedrock ranges from about 6 to 20 inches. Included with this mapping unit are Wadleigh, Maybeso, and Kaikli soils, and many sheer rocky cliffs and rock outcrops. Development is severely restricted in these areas because of the difficulty for excavations; however, bedrock provides excellent foundation supports.

Wadleigh Gravelly Silt Loam (Wa)

This series consists of poorly drained soils which have formed in compact glacial till along the lower mountain slopes of the uplands. Subsurface texture ranges from silt loam to very gravelly loam above a firm glacial till that impedes drainage at a depth of 15 to 25 inches below the surface. Shallow groundwater is commonly perched above this impermeable substratum. Because of the perched water conditions and seepage in the upper soil zone, development for building foundations and shallow excavations is severely limited. The limitation for septic drainfields is very severe because of the perched water table and low soil permeability. This soil is classified GM or SM in the Unified Soil Classification System.

Summary

The soil factors that most influence land development are the relative ease and expense of site preparation, the supply of water, and the ability to treat septic effluent through soil absorption. Where public water and sewer facilities are provided, the latter are not necessary.

Alluvial soils typically contain clay, silt and organic matter, and the groundwater is usually at or near the surface. Artificial drainage and soil compaction or fill is usually required for development, and heavy structures commonly require pile foundations. These areas are subject to occasional flooding. The gravelly soils are suitable as sand and gravel.

The shallow depth to bedrock or compact impermeable substratum of the upland till soils limits the ease of excavation for foundations and utilities. These soils commonly have a perched ground-water table that is susceptible to contamination from failed septic systems. The steep slope areas are prone to slope failure and erosion.

The organic peaty soils are highly compressible and cannot support roads or most structures without differential settlement. Compaction and fill or complete excavation is usually required to obtain stable conditions for roads or buildings. Deep peat areas may require pile foundations. Fill may also be required due to difficulty of drainage.

Development hazards are further described in the following Hazards section. Water availability and septic suitability are discussed under Hydrology.

HAZARDS

Naturally occurring hazards are events that directly or indirectly affect the human environment and living conditions. Damages from natural processes, such as loss of property and life, increase when there is pressure for growth in hazardous areas and human alteration of the natural environment. These losses can be lessened or prevented by knowing what the hazards are and by planning development to avoid hazardous areas.

In the CBJ, the principal natural hazards are seismic hazards, landslides and avalanches, and floods. They are described in terms of location of occurrence; the predictive probability of occurrence, if known; and the expected effects of a given event.

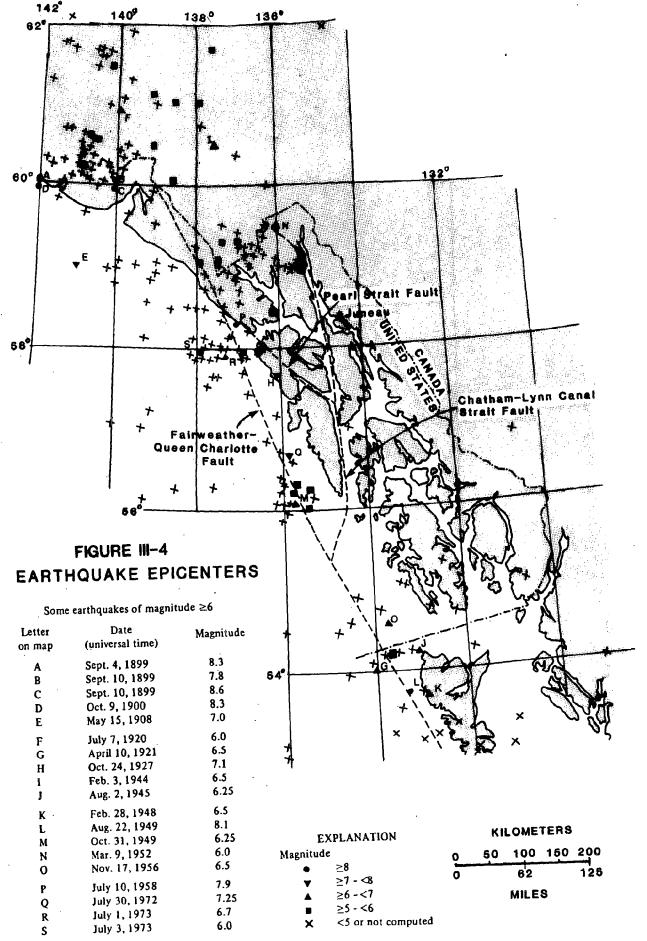
Seismic Hazards

Faults

Southeast Alaska lies within the Circum-Pacific seismic belt, which has been seismically active since at least early Paleozoic time. Continued seismic activity, as well as glaciation, has been a major factor in shaping the present land forms. Long linear fjords and nearly straight alignments along stream valleys are evidence of structural control and erosion along fault zones. The major linear features in the Juneau area, shown in Figures III-1 and III-4, are the Gastineau Channel, the alignment of Montana, Windfall and Cowee Creeks, and the alignment of Lynn Canal and Chatham Strait. These have been mapped as major faults. The Lynn Canal-Chatham Strait is only 3 to 6 miles wide along most of its length and extends for over 250 miles from Skaqway to the southern end of Baranof Island. Other inferred faults, which have been mapped by Barker (1957), and Twenhofel and Sainsbury (1958), are those in the Juneau area and along Fish and Peterson Creeks on Douglas Island. Possible faults have also been noted at the base of and parallel to Auke Mountain and from Lena Cove to near Point Louise on Auke Bay. The Silverbow Fault along Snowslide Gulch adjacent to Gold Creek was first mapped by Spencer in 1906.

Earthquakes result from movement and breaking of rocks along faults, which may or may not break the ground surface. Although the faults which have been mapped within the area show no evidence of historical activity or movement since Pleistocene time approximately 2 million years ago, the area has experienced ground shaking from distant earthquakes (Miller, 1972). The nearest known active fault is the Fairweather Fault, located about 100 miles west of Juneau (Figure III-4). The Lynn Canal-Chatham Strait Fault, which passes near the northern portion of the study area, has had no historical activity associated with it; however, because of its relationship to other major faults in southeast Alaska, it cannot be considered inactive (Miller, 1972).

Figure III-4 shows the location of earthquakes in southeast Alaska between 1899 and 1975. Earthquakes commonly occur west of Baranof Island, southwest of Skagway, near the Fairweather Range, and northwest of Yakutat. These earthquakes are considered of shallow origin with properties similar to those of shallow focus earthquakes occurring elsewhere (Yehle, 1979). Only two earthquakes between Richter magnitude 5 and 6 was recorded within 100 km (62 miles) of Juneau, and 5 earthquakes greater or equal to magnitude 6 were recorded within 200 km (125 miles) of Juneau between 1927 and 1973 (Figure III-5). Earthquakes occurring beyond 200 km of Juneau probably would not result in serious damage to structures in the area (Miller, 1972).



III- 14

SOURCE: Yehle 1979

Earthquake Potential

A general assessment for the earthquake potential in the area can be made on the basis of limited seismic data. Seismic risk maps predict the maximum level of shaking that can be expected for a given area based on analysis of historic seismic activity and the tectonic framework. These include the seismic zone map of the Uniform Building Code, 1976, and the seismic risk map prepared by the U.S. Army Corps of Engineers (1973). These maps delineate areas in which a given intensity or magnitude can be expected. The frequency of earthquake occurrences is not predicted.

The Seismic Risk Map of the Corps of Engineers relates possible damage during an earthquake to the magnitude of the largest probable earthquake. Earthquake magnitude is a numerical value that describes the amount of energy released by the earthquake. Magnitude is commonly expressed by the Richter scale, and a one-unit increase of magnitude represents an increase of about 32 times in energy released. Hence, a Richter magnitude 8.0 has over 1,000 times the energy released for a magnitude 6.0. The Juneau area is in Seismic Risk Zone 3 in which major damage to structures from an earthquake equal to or greater than magnitude 6.0 might occur.

The Uniform Building Code Seismic Zone Map relates one of four zones to the Modified Mercalli intensity earthquake expected to affect that zone. The intensity of an earthquake describes the physical effects from ground shaking. The Modified Mercalli intensity scale consists of 12 categories designated by Roman numerals (Table III-1). Intensities are general descriptions of the earthquake's impact at a given location and will vary depending on the magnitude of the earthquake, the distance from the epicenter, the nature of the geologic and soil conditions, and the quality of building construction. The CBJ is in Seismic Zone 2, for which moderate damage from an intensity VII event could occur.

Effects of Earthquakes

This evaluation of the geologic effects of future earthquakes is based on the assumption that earthquakes will continue to affect the area. It is important to know what can happen during an earthquake, and how best to minimize potential damages. Ground shaking is the primary effect of an earthquake; depending on local geologic characteristics, other possible effects include liquefaction, ground fracturing and water or slurry fountains, compaction and related subsidence, landsliding, and tsunamis and seiches. The following discussion on the effects of earthquakes has been obtained from Miller (1972) and Yehle (1979).

Ground Shaking

Ground shaking causes most of the damages to buildings and other structures during earthquakes. Shock waves are generated along a

Table III-l

MODIFIED MERCALLI INTENSITY SCALE

- I. Not felt except by very few under especially favorable circumstances.
- II. Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
- III. Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.
- IV. During the day felt indoors by many, oudoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
 - V. Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles and other tall objects sometimes noticed. Pendulum clocks may stop.
- VI. Felt by all, many frightened and run oudoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
- VII. Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
- VIII. Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Disturbs persons driving motor cars.
 - IX. Damage considerable in specially designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

MODIFIED MERCALLI INTENSITY SCALE (continued)

- X. Some well-built wooden structures destroyed; most masonry and frame structures destroyd with their foundations; ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (sopped) over banks.
- XI. Few, if any (masonry), structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
- XII. Damage total. Waves seen on round surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

fault and travel through rock materials, causing the ground to vibrate. The intensity of ground shaking is dependent primarily on the magnitude and duration of the earthquake, the distance from the fault, and the local geology. Damages sustained by a structure are largely a function of the building design and the material on which it is built. Shock waves traveling through less dense materials tend to decrease in velocity and increase in amplitude; accelerations become greater and ground motion lasts longer. Therefore, structures located on less dense material such as alluvial and water-saturated sediments generally suffer far greater damages than structures located on rock or compact glacial till soils.

Liquefaction

Liquefaction is defined as the transformation of granular material from a solid state into a liquified state as a consequence of increased pore-water pressure (Youd, 1973). This transformation is most likely in saturated, unconsolidated sedimentary deposits. Especially susceptible are deposits near the airport and Lemon Creek flats containing well-sorted, fine to medium grained particles such as coarse silt and fine sand. Liquefaction accompanies other earthquake effects such as ground-facturing and water-sediment ejection.

When loose granular sands are subjected to ground vibrations from earthquakes, an increase in pore pressure occurs, resulting in movement of water to the ground surface. The development of high water pressure tends to turn the soil into a "quick" or liquified state. As liquefaction develops, automobiles, structures, and other objects gradually settle into the resulting quicksand, and lightweight buried objects tend to float to the surface. If liquefaction occurs on a gently sloping surface, the entire soil mass will tend to flow or move laterally with resultant cracks, fissures, and differential settlement.

Liquefaction potential is dependent on the soil type and its relative density, the intensity and duration of ground vibration, and depth to water table. Clay free granular delta and intertidal sands (Tf) near the airport and Lower Lemon Creek flats have the highest potential for liquefaction in the Juneau area. Detailed soils engineering and geologic investigation, especially density of underlying materials, are necessary to evaluate the potential for liquefaction on a site-specific basis.

Ground Fracturing and Water-Sediment Ejection

Ground fracturing and ejections of sediment slurries or water occur during large earthquakes where loose sand-sized materials are dominant in a deposit and where the water table is shallow and restricted by a confining layer, which can even be seasonally frozen ground (Yehle, 1979). Ground shaking increases the hydrostatic pressure as in liquefaction and, if the confining layer ruptures, the water and sediment erupt along ground fractures or

from point sources. Compaction and ground subsidence often accompanies ejection. Deposits within the area susceptible to ejection are moraine soils (Mh), outwash soils (He), alluvial deposits (Am) and tidal flats (Tf) (Figure III-3).

Compaction and Settlement

Settlement or compaction of loose soft sediments or improperly placed fills occurs from long-term stress due to loading by roads or structures, or by compaction during earthquake vibrations. The greatest amount of settlement occurs in loose, thick deposits consisting of silt to small pebble-sized material and areas of high groundwater, and where strong shaking persists for at least a few minutes (Yehle, 1979).

Differential settlement in buildings, where one portion settles more than another, can cause strains that substantially weaken the structure. During an earthquake, serious structural damage could result from additional compaction and settlement due to non-uniform soil or fill conditions. Flooding due to settlement could occur in low-lying areas. Soils susceptible to compaction during strong ground shaking from an earthquake include moraine (Mh), outwash (He), alluvium (Am, Co), alluvial fans (Sa), and peaty soils (Ma, Ko).

Landslides

Landslides are a common result of ground shaking from moderate to large earthquakes. Movements may consist of single or multiple slide events and may be subaerial and underwater landslides. Failures of delta fronts, small scale slumping, and rock falls are several types of landslides that could occur. Numerous geologically-recent slides conspicuously mark the hillslopes of Heintzleman Ridge, Gold Creek and Mount Roberts. Landslides and avalanches are further described in the next section.

Tsunamis and Seiches

Earthquakes can trigger large water waves that could cause destructive flooding to shore areas. These may be along coastal areas or in enclosed or partially-enclosed basins. Wave types include tsunamis, seiches and waves caused by landsliding.

Tsunamis, or tidal waves, are long-period water waves generated in the ocean by fault displacements or other abrupt ground movements on the sea floor. In the open ocean, tsunamis travel at speeds of 300 to 500 miles per hour, and may have wave lengths of many miles. As the tsunami approaches shore, the speed decreases and the height of a wave increases rapidly, depending on offshore topography, tidal phase, coastline orientation and configuration (Wilson and Tørum, 1968). Waves may reach tens of feet in height.

A seiche is an oscillation, or sloshing back and forth, of the surface water in an enclosed or semi-enclosed basin. Its period

is controlled by the length and depth of the containing basin. Seiches are initiated chiefly by local changes in atmospheric pressure, aided by wind and currents. The terminology was first applied to standing waves set up on Lake Geneva by these conditions. Seiches set up on rivers, reservoirs, ponds, and lakes can also occur due to passage of seismic waves from an earthquake. These are termed seismic seiches. Seiches can also be caused by other mechanisms such as landslides, submarine slides, tilting, and tsunamis.

Massive underwater and subaerial landslides related to shaking during earthquakes have caused small to very large waves in bodies of water. The July 10, 1958 earthquake triggered a landslide which generated a seiche with a wave run up of 530 meters in Lituya Bay, Alaska.

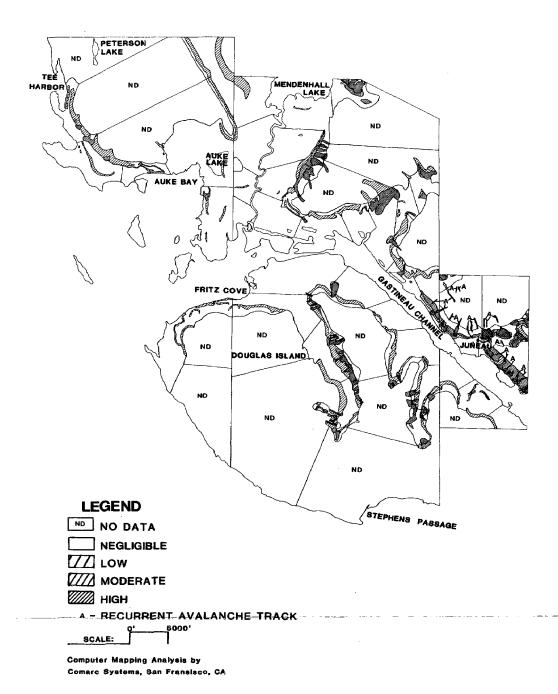
It is unlikely that tsunamis from the ocean would cause damage in the Juneau area because of the protection offered by its inland location. However, seiches with wave runups in excess of 5 feet have a low to moderate probability of occurring in Gastineau Channel, Auke Bay, the north Douglas Island area, Lena Cove, and Tree Harbor (Miller, 1972). Additional coastal flooding resulting from combined high tides and high winds will result in storm surges and wave runups. These coastal flood hazards are further described in the Flood Hazard section.

Landslides/Avalanches

Landslides and avalanches are described together primarily because of their common origin of occurrence. Snowslide avalanches are highly susceptible on steep, brushy or non-vegetated slopes. The debris and rubble (talus or colluvium) at the base of steep rock slopes consist of soil and rock materials which were deposited by slow erosional processes and/or by sudden large scale movements of snow, rock, or a mixture of the two. These debris slopes are susceptible to landslides, and snowslides or rockfall avalanches will continue to occur on such steep rock slopes. Landslide and avalanche hazard areas are shown in Figure III-5. Recurrent avalanche chutes are indicated with an "A" above the chute on Figure III-5. The location of major landslide deposits mapped by Miller (1972), avalanche zones identified by Daniel, Mann, Johnson, and Mendenhall (DMJM, 1972) and review of color infrared aerial photos were used to locate landslide/avalanche areas on the map. These maps should not be used for site planning purposes. Detailed avalanche zone maps, not smaller than 1:10,000 (1 inch = 800 feet) prepared by Frutiger (1972), and site-specific investigations are more appropriate.

Landslides

Landslides or mass-wasting deposits include colluvium and talus, debris-flow deposits, and rockslide avalanche deposits. Gravity plays an important role in the accumulation of these materials, and water and snow aid in their transport. Some deposits accumu-



Full-size copies of this map are available at the CBJ Planning Department.

late by falling through the air and bounding down the mountain slopes.

Weathering processes, especially frost action by freezing and thawing of water in rock fractures, greatly weaken the rock and increase the susceptibility to down-slope movement. The type of movement may be slow or fast and is dependent on the rock type, degree of weathering, slope, and moisture content. Movement can occur as creep, slide, flow, or fall. The mass-wasting deposits identified by Miller (1972) and the susceptibility to down-slope movement are described below.

Colluvium and talus represent the accumulation of rock and soil particles at the base of the steep mountain slopes. deposits are formed by the slow down-slope transport of rock and soil aided by rainfall, snow or ice; by individual rock pieces that fall and bound down the slope; and by soil materials that accumulate as a result of snow avalanches. Several large talus and colluvial deposits have coalesced, forming continuous aprons at the bases of steep mountain slopes. Examples are south along the Thane Road, Upper Gold Creek Basin, the mountain slope between Salmon and Lemon Creek, and the eastern slopes of Fish Creek Valley on Douglas Island. These deposits range in thickness from a few feet near the upslope portion to more than 15 feet at the base. Colluvium and talus are unsuitable for structures because the loose unsorted deposits are susceptible to downslope movement and the hazard of occasional rock falls from above that may occur from time to time. These deposits are moderately susceptible to landsliding (Figure III-5).

Debris flow deposits represent water-saturated loose residual materials that moved rapidly down steep slopes. Their extent, as mapped by Miller (1972), is limited to Mount Roberts-South Franklin Street in Juneau and the Salmon Creek Valley. These flows occurred after sudden or unusual amounts of water were added to soil material forming on steep slopes. It is not known whether future flows will move exclusively along former debris flow paths or in material that has not previously exhibited debris flow. The recurrence rate of debris flows has not been determined. However, because heavy or prolonged rainfall preceded the former flows, it appears likely that future flows could occur in the fall; slope and geologic conditions suggest the South Franklin Street area would be the most susceptible location in the study area for future debris flows.

Rockslide avalanche deposits represent the extremely rapid downslope movement of rock from steep bedrock cliffs. They may originate as one or several blocks that separate and slide off the mountain face. The rock tends to disintegrate as it falls and quickly becomes a mass of sliding, rolling, and bounding rock debris. Miller (1972) has identified five rockslide avalanche deposits in the study area. He describes the one outside Juneau as:

"...the rockslide-avalanche started on the side of Mount Juneau, where a large scar can be seen, crossed the Gold Creek valley, and rose more than 180 feet on the opposite slope where the deposit now partly covers a bedrock ridge that connects Mount Maria to Mount Roberts. Spencer (1906, page 83) recognized the large deposit in Gold Creek Valley as an ancient slide or avalanche that dammed Gold Creek. This deposit in Gold Creek valley is at least 38 feet thick and is so massive and the fragments so large that to the casual observer the debris looks like knobs of bedrock surrounded by surficial material. High on the bedrock ridge large scattered blocks form a deposit about 300 feet wide ... The leading edge of the avalanche projected off the Mount Maria-Mount Roberts ridge and continued down to the site of Juneau. Isolated angular fragments 2 feet or more in largest dimension provide evidence that the avalanche reached at least as far as the upper part of Sixth Street. Building and grading over the years probably removed or buried most of the fragments."

The cause of rock slides may be the weathering along joint fractures which weakens the rock over a long period of time and provides the necessary instability to initiate the rock fall. The freezing and thawing of water in rock fractures and the continued expansion of joint sets from stress release since deglaciation may also be a contributing factor in weakening of the rock mass. Ground vibrations from even small earthquakes could act as triggering mechanisms causing individual fragments or large masses of rock to dislodge from cliffs. Large earthquakes are likely to initiate some rock-fall avalanches. Steep unvegetated slopes are especially prone to rock fall and snowslide avalanches. These areas are indicated as high landslide avalanche potential in Figure III-5.

Snowslide Avalanche

Snowslide avalanches result from a combination of climatic factors and the characteristics of the mountain slope on which the snow accumulates. These factors include steepness of slope and the type and extent of vegetative cover, if any. The frequency or record of past events and terrain characteristics is used to define snowslide avalanche zones.

Climatic factors, including the temperature and snow quality, are important in determining the potential type and magnitude of avalanches for a given terrain unit. The climatic data in the CBJ, however, does not provide information concerning snow cover conditions. The type and extent of snow cover and strata of ice lenses within a snow deposit determines the type and potential magnitude of snow avalanche.

Avalanches are either dry snow, airborne powder type or wet snow slurry type that flows along the ground in natural gullies. The Behrends Avenue avalanche of March 1966 was a dry airborne powder avalanche. They are the most destructive and can attain speeds of 200 miles per hour. These avalanches are not restricted to existing gullies. A pressure wave or wind blast that precedes the snow avalanche is responsible for the most damaging effects. Wet snow avalanches usually follow heavy wet snowfalls. These avalanches usually travel at slow speeds and follow the course of natural gullies.

Generally, large avalanches are prevented by the continual breaking of small and shallow slides. However, thick snow accumulations and triggering from falling cornices, rockfalls, animals, or earthquakes could initiate massive snow avalanches.

The distribution of vegetation is a key indicator for the purpose of mapping avalanche zones. Brush covered slopes are possible indicators of past avalanche zones. The age of occurrence can be determined by past records of landslides or approximately by dendrochronology. The age of the last destructive avalanche to occur in a given area cannot be younger than the oldest tree that grows in its path. Areas of old trees (+200 years) could be susceptible to avalanches, however, the probability of avalanche occurrence is greater in areas of younger (<25 years) trees or slopes covered in brush.

Because of the limited climatic records for determining avalanche occurrences in the area, topography and vegetation patterns were used to delineate avalanche zones (Frutiger, 1972). Snow avalanche starting zones are indicated on the landslide-avalanche map (Figure III-5) as high hazard area. These areas are exposed to frequent and powerful avalanches and are sources of rockfall avalanches and talus slopes.

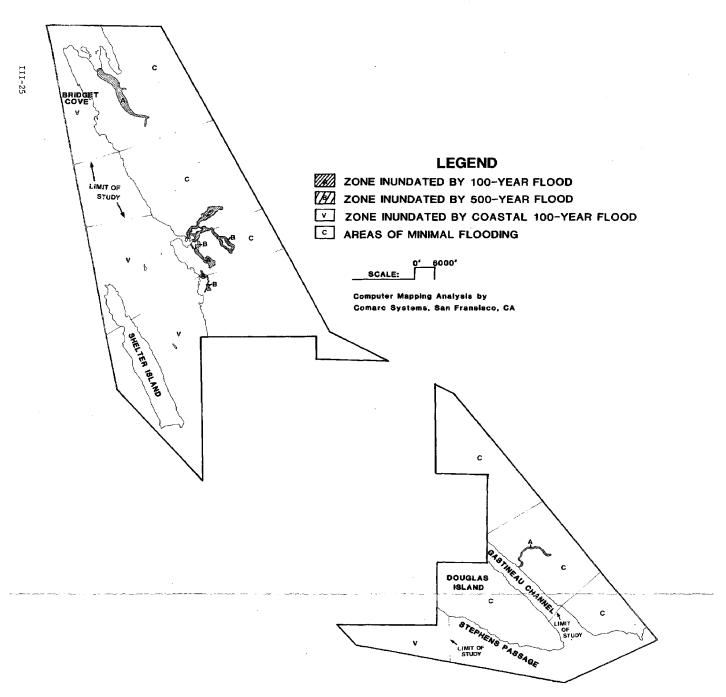
Flood Hazards

Floods are a result of climactic related factors and urban development that alter natural flow conditions in flood prone areas. Warm rainfall on a heavy snowpack contributes to high base stream flows and may result in flooding. The most serious flooding results when peak stream flows occur simultaneously with high tides. The flood hazard is exacerbated by urban development in stream valleys. The creation of impermeable surfaces results in increased volumes and rates of storm runoff, and numerous stream crossings and undersized culverts can become blocked by stream debris or ice, which restricts the passage of storm flows. Coastal flooding can occur as a result of combined high winds and high tides that will create storm surges and wave runups.

A Flood Insurance Study (Corps of Engineers, 1980) was conducted for the City and Borough of Juneau through the U.S. Department of Housing and Urban Development, Federal Insurance Administration, to aid in the administration of the National Flood Insurance Act

STUDY AREA

FLOOD ZONES



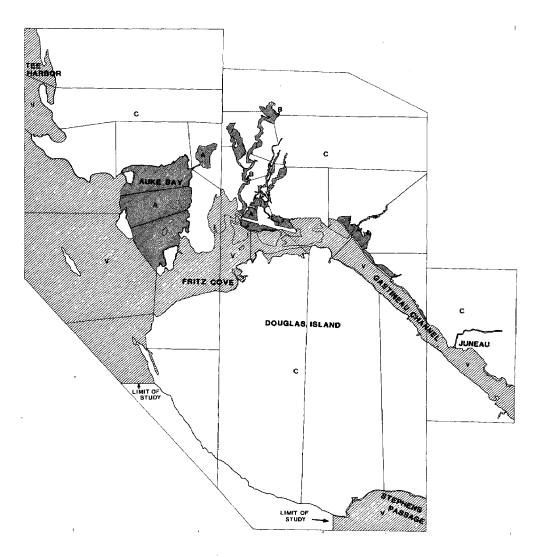
Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

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Juneau, Portland, Seattle



LEGEND

- ZONE INUNDATED BY 100-YEAR FLOOD
- ZONE INUNDATED BY 500-YEAR FLOOD
- ZONE INUNDATED BY COASTAL 100-YEAR FLOOD
- AREAS OF MINIMAL FLOODING



Computer Mapping Analysis by Comarc Systems, San Fransisco, CA

Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA



of 1968 and the Flood Disaster Protection Act of 1973. This study includes maps, profiles and descriptions of flood hazards associated with stream and coastal flooding. The flood zones shown in Figures III-6 and III-7 were developed from the Flood Insurance Rate Maps (FIRM), February 1981. This study supersedes the floodplain information reports prepared by the Corps of Engineers in 1967 and 1971.

Principal Flood Problems

Records of past flooding are limited. The greatest known floods were in 1927 and 1943, with most of the damage occurring along the Mendenhall River. The primary cause of flooding was rapid runoff during heavy rains. Because stream gauges were not installed in Lemon Creek until 1954, or in the Mendenhall River and Montana Creek until 1965, it is impossible to determine the frequency of these past floods. The greatest recorded flow for Lemon Creek was in August 1961 and in September 1967 for the Mendenhall River.

Stream gauge records indicate that the peak annual discharge occurs in the fall months when average monthly precipitation is highest. Summer and fall floods can result from extreme rainfall in short periods of time. Stream discharges of Montana and Lemon Creeks correlate with the amount of rainfall; however, runoff from the Mendenhall River is masked by glacial melt during the summer months. About 90% of the runoff from the Mendenhall River occurs during the summer, indicating that glacial melt accounts for a substantial amount of the flow (COE, 1980). Runoff patterns of most streams in the study area are similar to those of Montana Creek.

The streams in the Mendenhall Valley flow through fairly dense residential developments which have resulted in construction of numerous culverts and bridges. Many culverts and some bridges on Duck and Jordan Creeks are inadequate and result in backwater Blockage by debris and ice, high velocity flows, and siltation of culverts are principal causes of flooding in the The Old Glacier Highway bridge in Lemon Creek Valley was a major source of flooding, because of stream flow restrictions. Annual dredging on both sides of the bridge undermined the bridge and caused extensive damage, but combined with installation of larger culverts has reduced the likelihood of flooding (COE, 1980). Deepening the channel by annual dredging to present levels is required to retain the 500 year flood within the stream Other flood control measures in the area include the construction of the flood control channel in Gold Creek in 1958, which has reduced its flood hazard, construction of the airport on fill to protect it from stream flooding, and dikes to protect it from coastal flooding.

Coastal flooding was analyzed by the Corps of Engineers (1980) for the 10 and 100 year frequency floods, using tidal elevation data and determination of storm driven wave runups. Wave runup

Table III-2
SUMMARY OF COASTAL FLOODING ELEVATIONS

	Elevation (feet)			
Flooding Source and Location	10-Year	50-Year	100-Year	500-Year
GASTINEAU CHANNEL				
Juneau Bridge to Douglas Harbor Douglas Harbor to	20.5		23.0	
Bullion Creek Mendenhall River to Juneau Airport extended Juneau Airport extended to Sunny Point	23.0		26.0	
	21.0		23.0	
	22.5		23.5	
AUKE BAY				
Auke Cape to Spuhn Island	20.0		22.0*	
STEPHENS PASSAGE				
Point Lena to Auke Cape	23.0		25.0	
FAVORITE CHANNEL				
Point Lena to Lena Cove Lena Cove to Tee Harbor Huffman Harbor to	27.5 24.0	 	30.5 26.5	
Eagle Harbor	22.0		24.5	

^{*}This is the highest tidal elevation, which is approximately equal to the 100-year elevation and designated as flood zone A. The 100-year storm surge and wave runup elevation is 21.0.

is the distance the combined tidal and storm-generated wave will move up the shoreline. This distance is considerably less for steep sloping beaches than for shallow beach fronts. Detailed analyses were conducted for downtown Juneau, Douglas, Juneau airport, Auke Bay, Point Lena and Lena Cove, and Eagle Harbor. The extent of coastal flooding and flood elevations are shown in Figures III-6 and III-7 and in Table III-2. The fetch, or the unobstructed area over water that the wind can blow, and wind speed are the most critical factors in determining wind and wave setup elevations. Storm setup is then added to the tidal frequency to obtain the highest possible water surface elevations. The maximum wind setup is about 0.2 feet, due to the relatively short fetch and low wind speeds, and the highest wave setup calculated for Lena Cove is 1.5 feet. The major coastal flooding areas are along the low bank shorelines adjacent to the airport.

Floodplain Management Applications

To assist in sound floodplains management, the Federal Insurance Administration (FIA) has adopted the 100-year flood as a national standard. The floodplain boundary shows the limit of expected flooding but does not indicate the potential hazard or depth of flooding in a given area.

To determine the flood hazard potential of various sites, the Federal Insurance Administration uses the Flood Hazard Factor (FHF) to:

"...correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based in FHF's from 005 to 200. After the determination of reaches and their respective Flood Hazard Factors, the entire incorporated area of the municipality was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A: Areas subject to 100-year shallow flooding where average depths are not known; determined by approximate methods only.

Zone AO: Special flood hazard area inundated by types of 100-year shallow flooding where depths are between 1.0 and 3.0 feet; FHF's are not determined.

Zones A1, A2 ... A5: Special flood hazard areas inundated by the 100-year flood with base flood elevations determined and zone designations assigned according to FHF.

Zone V: Special Flood Hazard Areas along coasts inundated by the 100-year flood, as determined by approximate methods, and that have additional hazards

due to velocity (wave action); no base flood elevations shown or FHF's determined.

Zone V2, V4, V5, V6: Special Flood Hazard Areas along coasts inundated by the 100-year flood as determined by detailed methods, and that have additional hazards due to velocity (wave action); base flood elevations shown, and zones subdivided according to FHF's.

Zone B: Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.

Zone C: Areas of minimal Flooding."

(Flood Insurance Study, 1980).

Summary

Groundshaking from earthquakes centered on distant faults can cause damage to structures on the loose, saturated alluvial soils and can dislodge rock, soil, or snow from steep slopes and damage structures at the base of slopes. The groundshaking responses for each soil type to a given earthquake has been rated from poor to best by Miller (1972). Soils with poor foundation conditions include alluvial soils, tidal flats, and muskegs. Ground responses can result in ground fracturing, liquefaction, or differential settlement, or induce landslides, rock falls, or avalanches. Landslide and avalanche zones identified as high hazard zones (Figure III-5) do not necessarily require groundshaking from earthquakes to act as triggering mechanisms.

The debris and rubble at the base of steep slopes consist of soil and rocky materials which were deposited by slow erosional processes and/or sudden large-scale movements of snow and/or rock. These areas, characterized by steep brushy or non-vegetated slopes, are highly susceptible to continued snowslide avalanches and landsliding. The debris or talus slopes at the base of the mountains are also susceptible to mass wasting.

Floods occur as a result of several natural and development related factors. Flood hazard is greatest during the fall months during intense periods of rainfall and when base flow from glacial melt is highest. Development that encroaches onto floodplains, floodway obstructions, and restrictions to flow at culverts and bridges can increase the flood hazard in urban areas. Coastal flooding can result during combined high tides and storm events.

MINERAL RESOURCES

Mineral commodities within the CBJ consist of metallic minerals, primarily gold and silver with associated lead and zinc; non-metallic minerals including garnet, graphite, marble, and possibly mica; and sand and gravel, sand, and quarry rock for construction purposes. The occurrence of garnet, graphite, marble, or mica is not considered to be of economic importance and, therefore, is not described in this section. Information regarding metallic minerals was obtained from published U.S. Geological survey reports and from the Alaska Department of Natural Resources. Information on sand and gravel resources was obtained primarily from an R & M consultants (1978) report.

Metallic Minerals

The study area is located entirely within the Juneau gold belt, which extends from just north of Berners Bay to just south of Windham Bay. The first metalliferous deposits of the gold belt were found near Juneau in 1880. Prospecting was most intense around 1900-1910, but mining dwindled away by World War II. Mines on the mainland near Juneau and on Douglas Island have produced more than 6.5 million ounces of gold, several million ounces of silver, and more than three-quarters of the lead produced from Alaska (Berg and Cobb, 1967). Another 23,000 ounces of gold was produced by mines between Berners Bay and Auke Bay (Berg and Cobb, 1967).

Recent interest in mining has revived as gold and silver prices have risen. Although prices have dropped in the last two years, they are expected to rise again. In late 1981, mining was Alaska's fourth largest industry and the fastest growing industry (Conwell and Eakins, 1982).

The gold belt is contained in a thin belt of metamorphic rocks adjacent to the coast range granitics. most of the ore occurs in quartz veins or veinlets within slate; however, other host rocks for the quartz veins are known (Berg and Cobb, 1967). On Douglas Island, the veins are within granitic bodies cutting slate and greenstone (volcanic). A prospect along Carlson Creek is located in schist and gneiss. Occurrences on the upper Lemon Creek are in a gneissic granitic body. Between Berners and Auke Bays host rocks include slate and graywacke, with some granitic and gabbroic occurrences.

Although metalliferous deposits are usually noted for their gold content, other metals are often associated. Silver, lead, and zinc commonly occur with gold, and in some ore bodies, copper is found. Metalliferous minerals typically include pyrrhotite, sphalerite, galena, pyrite, arsenopyrite, chalcopyrite, and tetrahedrite (Berg and Cobb, 1967). Douglas Island deposits also contain molybdenite and magnetite, with some scheelite, arsenic, realgar, and orpiment (Berg and Cobb, 1967).

In some places, metals other than gold may occur in economically feasible quantities. Active mining claims which list mineral commodities in the Juneau area are on file with Alaska Division of Geological and Geophysical Surveys (1982). Active silver claims occured at Mount Adolph Knopf, along upper Lake Creek, near Silverton Basin, and near Thane in 1981. Older silver claims were filed on Douglas Island across from Thane. Copper claims are located on Lincoln Island and the upper Eagle River. Lead claims have been filed west of Eagle glacier, near Stroller White Mountain, near Silverbow Basin on the gold Fork of Carlson Creek, and on eastern Douglas Island across Gastineau Channel from Thane and Dupont. Zinc, arsenic, zirconium, tin, and iron may be occasionally obtained as well.

About half the gold is in native form; the rest is combined with sulfides (Buddington and Chapin, 1929). Generally, the higher the sulfide content of a deposit, the higher the ore's value. In particular, large quantities of arsenopyrite and galena have been associated with highest gold tenor (Berg and Cobb, 1967). Similarly, high galena and sphalerite contents have been associated with higher silver tenor (Buddington and Chapin, 1929).

The ore tends to be neither high grade nor extensive. Berg and Cobb (1967, page 155) report that:

"Few of the ore bodies mined in the Juneau gold belt would have been considered rich by ordinary standards; much of the ore produced from the major mines contained less than a dollar's worth of gold and silver per ton, and most of the ore bodies were bounded by assay rather then geologic limits. The Alaska-Juneau mine, the last to close, could not reopen after World War II because the margin between the fixed price of gold and rising operating and labor costs had disappeared."

Mining activity has been sporadic in the City and Borough of Juneau (Alaska Department of Natural Resources (DNR), 1982). The most active periods were 1900-1912, 1935-1937, and the mid-1970's to present. Increasing numbers of claims have been recorded in the past decade. In particular, a record amount were filed in 1980 and 1981. About half the claims from the early 1900's have been restaked recently (Judy Sigler, personal communication, 1982).

Valid claims are annually leased mineral rights on state or federal land. A claim can only be staked <u>after</u> discovery of a commodity at the site and can only be renewed if time and money have been actively invested in mining activities.

Much of the City and Borough of Juneau is accessible by road, making small-scale mining operations viable. Most of the claims have been filed by small groups of people or by individuals (Judy Sigler, personal communication, 1982). Big mining companies are also staking many claims, but generaly in less accessible areas.

Mining claims are scattered across the study area. They tend to be widespread where bedrock outcrops (Southeast Alaska Regional Profiles). Claims tend to be concentrated in certain localities: north and west of Eagle River and Glacier; north and west of Mendenhall River and Glacier; along Lemon Creek; Juneau-Thane-Clark Peak area; and the southeast half of Douglas Island (Alaska DNR, 1982). The highest concentrations of current claims occur near the upper Eagle River, upper Lake Creek, Peterson Creek, and southeastern-most Douglas Island.

Most claims are for lode deposits, where ore is contained within bedrock. However, there are some placer (streambed) deposits being mined. (Recent glacial erosion and steep terrain preclude extensive placer deposits.) Also, old mine tailings are being worked with new technology for fine-grained metal not obtained earlier.

Sand, Gravel, and Rock Products

Non-metallic mineral deposits used for construction purposes are classified as sand and gravel, sand, and quarry rock. Their value is dependent on location, the quality and quantity of the material, and the relative accessibility. These factors determine the expense of extraction and transport, and, ultimately, the cost of the product. The primary use is for construction aggregate as concrete or pre-stressed concrete products, road surfaces, and fill material for roads and building pads. Increased growth in the Juneau area has placed greater demand on the resources for use as fill, foundation, and roadway construction.

Sand and gravel are generally considered non-renewable resources, however, resource extraction on a limited basis can be obtained from river bars. They are derived from erosion and weathering processes by glacial and stream action, and their distribution is generally limited in a given area. Sand and gravel deposits occur in outwash plains, terraces, and alluvial valleys, river and stream beds, and glacial moraines. Existing and former gravel or rock quarries are shown in Figure III-2. The most extensive deposits occur in the valleys of the Mendenhall and Herbert-Eagle Rivers and Lemon Creek. Utilization of the Herbert-Eagle valley deposits for areas other than in the immediate vicinity is uneconomical because of transportation cost. Not all alluvial deposits are suitable for use because of the abundance of fines (silt and clay) or not enough coarse material for use as aggregate. The terrace deposits of Lemon Creek and the Lemon Creek flats have high quality aggregate reserves. Utilization of Mendenhall River bars and extraction in Lemon Creek to maintain the hydraulic floodway provide a limited Other suitable sources of sand and gravel are annual resource. precluded from use due to ownership restrictions and urban development. Upland glacial till may provide limited sources of fill material. These deposits, however, are not good sources of aggregate due to the abundance of fines.

Sand

Sources which are classified under this heading produce or are likely to produce material having 70% or more of its total dry weight passing the No. 4 (4.75 mm) U.S. Standard sieve and less than 10 percent passing the No. 200 (.074 mm) U.S. Standard sieve. The material is generally free draining and has a low frost susceptibility rating. Primary sources of sand are obtained from alluvial deposits within the Mendenhall Valley and adjacent to the Gastineau Channel. Sand also has been extracted extensively in the past in the vicinity of the Juneau Airport at the float pond borrow pit and Joe Smith's Mendenhall River pit on the west side of the river. The Smith-Honsinger pit northeast of the airport and south southwest of Egan Expressway is the last remaining large source sand pit in the valley. Sand is primarily used as fill where it is not subject to heavy loads. Where heavy loading is anticipated or if it is to be used for roads, armoring with a suitable top coarse is required.

Gravel

Gravel consists of deposits with more than 30% of their total dry weight retained on the No. 4 (4.75 mm) U.S. Standard sieve. At the lower end of the scale, no more than 10% of the dry weight should pass the No. 200 U.S. Standard sieve size. Gravel products are primarily used as asphaltic paving material and Portland cement concrete, and where compacted free draining fill for roadways and foundations is required. Sources of gravel occur as channel fill and bars in the Mendenhall River and alluvial and terrace deposits of the smaller streams such as Lemon and Salmon creeks. The major source of gravel is the Lemon Creek pit. Gravel products from alluvial fans and terraces require preprocessing such as screening, crushing, and washing to obtain the required grading for use as aggregate products.

Rock

Rock products are produced by quarrying to reduce rock to a manageable size appropriate for its intended use. Rocks within the area consist of greenstone and metavolcanic rock which is highly variable in its durability for use as construction material.

Rock products are used for a variety of purposes, varying from large sized riprap to concrete aggregate. The use of rock products as fill or aggregate is usually not justified because of the high cost of processing compared with sand and gravel products (R & M Consultants, 1978). Riprap is their primary use.

Estimated Reserves

R & M Consultants (1978) have identified existing and potential sites for sand and gravel production. Their report indicated that the Lemon Creek valley had the best source of aggregate products and an estimated reserve of about 4.98 million cubic

yards. About 1.5 million cubic yards of good aggregate reserves are estimated to occur between Mendenhall Valley and Juneau, including North Douglas Island, excluding state and federal ownership. This does not include estimated reserves of common or select borrow which may exceed 3 million cubic yards.

Records of past production of sand and gravel resources in the area have ranged between 2,500 cubic yards to over 1 million cubic yards annually (R & M Consultants, 1978). Additional production is likely to result as growth and development occur on the low lying alluvial soils of the Mendenhall Valley and Lemon Creek. It also should be noted that the soils which are generally well suited for septic drainfields and consequently urban development are also good source material for use as fill material or as sand and gravel aggregate products.

As growth and development continue in these areas, pressure increases to close existing pits. Development can preclude potential sources of sand and gravel from further use. This exclusion of nearby sources results in greater costs, due to transportation from more distant sources. Other than limited resources within gravel bars and sand production from the Smith-Honsinger pit, there are few remaining potential sources of sand and gravel within the Mendenhall Valley.

DEVELOPMENT CONSIDERATIONS

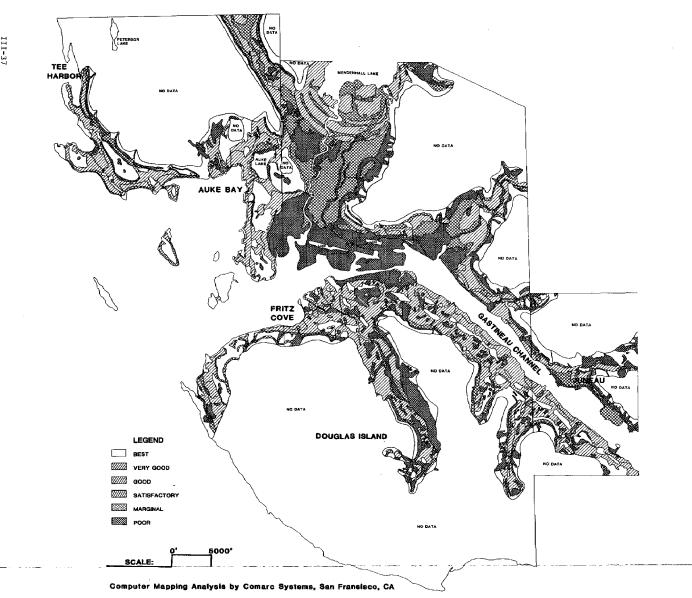
Much of the CBJ urban area is subject to natural hazards of one form or another. Their constraints can limit or seriously affect land developments. Certain developments may be more suitable in one area than another, or land characteristics at a particular area may favor non-compatible urban uses. The following land capability analysis discusses these limitations and hazards.

A basic factor used to determine site development suitability is soil characteristics. Important soil properties are permeability, shear strength, drainage, and texture. Depth to consolidated material or bedrock and topography (slope) are other important considerations. Site development capability assessment includes variables such as slope, response to groundshaking from earthquakes (foundation conditions), landslide/avalanche hazard, and flood hazards (Figure III-8). Development hazards can be differentiated into three categories (high, moderate, and low) based on the degree of severity or likelihood of groundshaking, slope failure, or avalanches from occurring as a result of an earthquake. Land suitability for septic drain fields and importance for groundwater supplies or recharge areas is discussed in the Hydrology section.

HIGH LAND USE HAZARD ZONE

High land use hazards include soils with poor foundation conditions (Figure III-8); areas with high landslide and avalanche potential (Figure III-5); and 100-year flood zones (Figures III-6 and III-7). Soils with poor foundation conditions identified by Miller (1972) are based on the anticipated groundshaking response due to an earthquake. Within the study area, this has been rated from poor to best. Soils with a rating of poor are included in the high land use hazard zone. These include tidal flat (Tf), alluvial (Co), and all peat soils (Figures III-3 and III-8).

The fact that groundshaking in the area will occur from earthquakes centered on distant faults is important. Groundshaking can cause damage to structures on the loose, saturated alluvial soils and can also dislodge rock, soil, or snow from steep slopes and damage structures at the base of the slopes. The ground responses that can occur in poorly rated soils include ground fracturing, liquefaction, differential settlement or differential compaction and ejection of water and/or sediment. These soils include soft alluvial soils of lower Mendenhall Valley near the airport, the freshwater wetlands of west Mendenhall Valley and the soils of Lower Lemon Creek flats. They typically contain clay, silt, and organic matter or loose granular fine sand. groundwater table is usually at or near the surface. Artificial drainage and soil compaction or fill is usually required for development in these soils and heavy structures commonly require pile foundations. The fill placed along the downtown Juneau



Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

waterfront has poor foundation characteristics and is rated as a high hazard zone (Figure III-8).

The accumulation of debris at the foot of mountain slopes in the area is evidence of unstable slopes and future landslides and avalanches. Known snowslide avalanche zones and areas of high landslide probability identified by Miller (1972) are included in the High Hazard zone (Figure III-5). These slopes are considered so unstable that future occurrences could occur even without the triggering action from earthquakes.

The 100-year floodplain (Zone A) and the coastal flood hazard area (Zone V) are designated as high land use hazards. Urban development should be designed to minimize the risk of flood damage and comply with federal insurance regulations. Certain developments or land uses, such as parks and open space, or gravel extractions, may be permitted within the 100-year floodplain. It should be noted that the 100-year floodplain generally includes soils with poor foundation conditions. Developments in these areas not only need to consider flood control measures and drainage provisions but also soil stabilization measures for building foundations may be necessary.

MODERATE LAND USE HAZARD ZONE

These hazards include soils with marginal foundation conditions (Figure III-8); potential landslide and avalanche zones (Figure III-5); slopes that exceed 35% (Figure II-1); and the 500-year floodplain (Figures III-6 and III-7).

Soils rated as having marginal foundation conditions (Figure III-8) (Miller, 1972) would react severely during an earthquake. They include saturated granular outwash (He, Am), moraine (Mh) soils, and alluvial fans (Sa) (Figure III-3). The reaction to groundshaking depends on the earthquake magnitude, distance, wave length, and amplitude and the duration of shaking. Ground response could result in differential compaction and settlement, ground fracturing, ejection of water and/or sediment, and could initiate any number of landslides in colluvial or talus slope material, or rock falls or snow slide avalanches. The accumulated debris (talus, colluvium) at the toe of the slopes are also potentially unstable and could fail during an earthquake because of the loose unsorted nature of the slope. Areas on slopes that exceed 35% that are not designated as having high landslide or avalanche hazard are included in the moderate hazard zone.

Moderate land use hazard areas include the 500-year floodplain as indicated in the flood zone maps (Figures III-6 and III-7). The depth of flooding has not been determined. These areas also include certain types of shallow flooding where depths are less than 1.0 foot.

LOW LAND USE HAZARD ZONE

Areas with acceptable foundation conditions (Figure III-8), low landslide hazard potential (Figure III-5), and slope between 20% and 35% (Figure II-1) are rated low land use hazards. Bedrock has the best foundation suitability, and dense well compacted glacial till (diamicton) soils respond well to ground shaking and sustain relatively the least damage during a large earthquake. The glaciomarine diamicton, third phase, (Miller 1972), consists of laminated sand, silts, and clays with occasional gravel. diamicton deposit has been mapped primarily as Wadleigh soils and may also be included as Kupreanof soils and may also underlie This deposit is extremely moisture sensitive. If Maybeso peat. disturbed material becomes wet or saturated, flowage can result and heavy excavating equipment can become bogged down. The soil will, however, become hard and firm in dry weather. Because of moisture sensitivity, these areas have poor to fair foundation suitability. Local site conditions, depending on soil density and moisture or degree of slope, react to earthquakes by compaction, settlement, and fracturing. The hazard of stream and coastal flooding is negligible.

RESOURCE CONSIDERATIONS

Increased production of sand and gravel resources is likely to occur as growth and development in the valley areas continue. Urban expansion can exert pressures for closing existing operations or precluding extraction of potential reserves. The exclusion of nearby sources results in greater costs, due to transportation from more distant sources. Present reserves of high quality sand and gravel are limited to the Lemon Creek Valley, upper Mendenhall Valley in National Forest Service Land, and in the Herbert-Eagle River valleys.

Despite the great number of active claims in the study area, little is known about the mining future of the area. Alaska'a Department of Natural Resources has no projections or forecasts for the City and Borough of Juneau (Jim Degan, personal communication, 1982). Many persons are looking for and finding gold; however, there are no confirmed reports of any major discoveries.

Section IV

Hydrology

IV. HYDROLOGY

INTRODUCTION

Water supplies for domestic, commercial, and industrial uses are obtained from the public water supply system and individual or community well systems. The public water supply system is described in the Public Facilities and Services section. Hydrology section deals with the sources, location, viability, and potential uses of water resources for individual and/or community systems and describes the potential hazards of contamination of water supplies due to poorly designed or installed septic drain field systems. Areas which are most and least suited for individual and community wells and septic drainfields are discussed below. This analysis is based on water resource information published by the U.S. Geological Survey and soil characteristics (see Earth Resources) and is intended for general planning purposes only. Detailed site-specific investigations are required to determine the suitability of particular sites for development.

EXISTING CONDITIONS

SOURCES OF WATER

Three sources of water are used for domestic supplies: precipitation, surface water, and groundwater. The use of rain water catchments for domestic sources is not extensive in the Juneau area. Water is generally obtained by direct withdrawal of surface water from lakes, streams, and springs or shallow collectors. Groundwater is obtained primarily from drilled wells and occasionally shallow dug wells.

Surface Water

The area has an abundance of year long flowing streams. Most of the larger streams originate as glacial meltwater; however, several are non-glacial. The Mendenhall River is the largest stream in the area; most of its flow is melt water from the Mendenhall Glacier. Additional sources of flow into the Mendenhall River include stream runoff from Nugget, Steep, and Montana Creeks. Other streams in the Mendenhall Valley are Duck and Jordan Creeks which receive runoff from the steep slopes of Heintzleman Ridge. Lemon, Salmon, Gold, and Sheep Creeks, and the Herbert and Eagle Rivers to the north of Juneau, all originate from the Juneau ice field. Several smaller streams which drain into Auke Bay and Auke Lake, Peterson Creek, and the streams on Douglas Island are non-glacial streams.

By comparison of stream flow hydrographs to temperature and precipitation records, a relationship between flow, temperature, and precipitation is shown to exist for both glacial and non-glacial streams (Barnwell and Boning, 1968). In the winter months, flows of both non-glacial Montana Creek and the glacial Mendenhall River are controlled by temperature, because variations in precipitation are not reflected in stream runoff. The summer flows of non-glacial streams react readily to rainfall. Warm summer temperatures, however, result in glacial melt, which may contribute up to 50% of the annual runoff from the Mendenhall River (McConaghy and Bowman, 1971). Nearly 90% of the annual runoff to the Mendenhall River occurs during the summer months. This is in response partly to the summer heavy rains and glacial melt. Minimum flows for both glacial and non-glacial streams usually occur in the winter months.

Groundwater

Groundwater is available throughout the area, but is extremely variable in quantity and quality. Unconsolidated alluvial and glacial outwash soils can yield adequate supplies for community and public supply systems. Consolidated glacial till and bedrock will generally supply only enough water for a single family and water obtained from these sources may occasionally dry up during extended cold winter or dry summer periods.

Unconsolidated alluvial deposits, in particular the Mendenhall and Lemon Creek Valleys, contain sufficient groundwater supplies for community and public supplies (McConaghy, 1971). These deposits consist of gravel, sand, silt, and clay. Gravel and sand/gravel are the best deposits for yielding groundwater. Silts and clays are the poorest because of their small pore spaces and low permeability. Textural variability in alluvial soils occurs horizontally as well as vertically and will consequently affect the potential yield of a given area. Yields from wells only several hundred feet apart may vary considerably. Geologic mapping (Miller, 1972) and water resource investigations (Barnwell, 1968) indicate that the east side of the Mendenhall Valley is best suited for a large-yield public well system. More than 300 gallons per minute could be pumped from wells without significant drawdown in this area (Balding, 1982).

Bedrock in the area consists of several different rock units, each with distinct physical characteristics (refer to Geology section). The availability of water in bedrock is limited to fractures and joint sets, because primary porosity and permeability are absent. Yields are dependent on the rock unit and the degree of fractures and closeness of joint sets. Well yields are generally limited to about 3 gallons per minute (gpm) but may be as high as 20 gpm (Barnwell, 1968).

Groundwater is recharged principally by precipitation. Fluctuations in water table levels respond to the differences between

recharge and discharge. Discharge occurs from pumping, evapotranspiration, and outflow to saltwater, streams and lakes during low water periods. The rate of groundwater outflow generally remains constant; however, the groundwater levels will respond to the amount of rainfall. Recharge of the aquifer and a consequent rise in water table levels, occurs after periods of extended rainfall.

Water Quality

The quality of the surface and groundwater depends on the source and location. Surface water is of good chemical quality and is soft; however, glacial-fed streams often contain objectionable amounts of sediment (glacial flour). Compared to surface water, groundwater is of poor quality, contains iron, and is moderately hard (Barnwell, 1969). Groundwater is of the calcium bicarbonate type.

Fresh surface water has a very low dissolved solids content; groundwater generally contains somewhat higher concentrations. Most (95%) of the groundwater, however, is within the recommended limits of 500 milligrams per liter (mg/l) for human consumption (McConaghy, 1971).

Except for high iron concentrations, the groundwater is of excellent chemical quality. An iron content of more than 0.3 ppm (parts per million) is considered unacceptable for domestic use by the U.S. Public Health Service Standards. High iron concentrations can cause stains on household fixtures unless it is specially treated before use.

Nitrate is present in groundwater at concentrations of 5 mg/l or less (McConaghy, 1971). Higher concentrations could indicate groundwater pollution from septic systems.

Salt or brackish water occurs in shallow deposits near the Gastineau Channel and in deep wells in the central portion of Mendenhall Valley (Barnwell, 1969; Balding, 1982). Groundwater pumping, particularly near the airport, could cause saltwater intrusion upvalley and contamination or an increase in chloride content of water in wells.

DEVELOPMENT CONSIDERATIONS

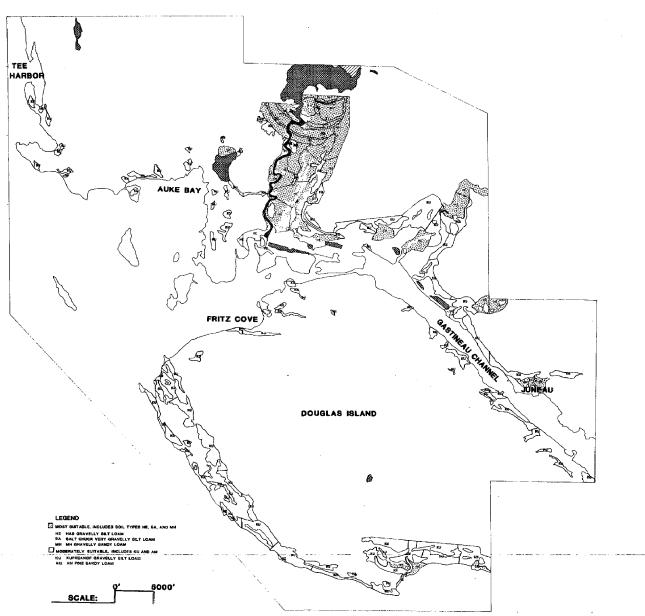
Important concerns in planning future growth in the CBJ include whether there are sufficient sources of water to meet the projected demands and whether the soils are suitable for disposal of septic effluent without contaminating water supplies. Sources of water for the public supply system are described in Public Facilities and Services section. Figure IV-1 shows those areas which are most and least suited for individual septic drainfields and, correspondingly, the potential for groundwater contamination. This assessment is based on soils and hydrologic units, and flood zones. Soils and hydrologic units reflect the degree of suitability for installation of septic drainfields and the potential yields for groundwater supplies. Developing drainfields in floodplains could result in groundwater contamination and system failure. Additionally, steep slopes can restrict the placement of individual or community systems.

The Earth Resources section includes a review of the soils in the area and their limitations for septic suitability. The soil features which limit the suitability of soil absorption systems are low permeability, seasonal high water table, susceptibility to flooding or inundation by high tides, and shallow depth to bedrock or impermeable soil horizon. Most of the soils in the area have at least one of these limitations.

The soils which are most suited for septic drainfields are coarse alluvial and outwash soils and alluvial fans that occur in east Mendenhall Valley and Lemon Creek (Figure IV-1). They also have the greatest yield of groundwater to wells. The potential contamination to groundwater supplies is slight to moderate because of the excessive permeability of the outwash soils and the flood hazard (for areas within the 100-year floodplain).

Gravelly sandy loam glacial till soils of the Kupreanof series (Ku) have moderate limitations for septic absorption fields because of the relatively low soil permeability. However, well designed systems can operate adequately in those soils. The depth to seasonal high groundwater is greater than five feet. These soils occur in scattered locations on the uplands and hill slopes from Tee Harbor to Auke Bay and Mendenhall Peninsula, and along the Gastineau Channel. More extensive deposits occur in upper Lemon Creek and along the Gold Belt of western Douglas Island. These soils potentially store large volumes of water and may be adequate to supply community systems.

The remaining areas of the CBJ contain soils that have low permeability, high seasonal water tables (less than two feet below the surface), or shallow depth to bedrock or impermeable soil substratum. These soils are unsuited for conventional drainfields and could result in failed systems or contamination to the groundwater. Soils consisting of clays and silts transmit water very slowly; consequently, wells are impracticable for



Computer Mapping Analysis by Comarc Systems, San Fransisco, CA

Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

N Sp these areas. Drilled wells completed in bedrock underlying these soils generally provide about 3 gpm, an amount adequate for single-family domestic use. Site-specific engineering studies are necessary to determine the suitability for single-family residential development using individual or community drainfields.

Soils that are located within the floodplain may be expected to be inundated occasionally. Some of these areas may also have high groundwater tables. Soil absorption fields should be excluded from the 100-year floodplain because of the hazard for system failure and groundwater contamination.

Slopes can limit the location of drainfields in certain soils. Generally, drainfields should not be designed for slopes greater than 15%, unless there are no restrictive layers in the soil and appropriate engineering design is provided.

Section V

Vegetation Habitat Types

V. VEGETATION HABITAT TYPES

INTRODUCTION

Plant species typically prefer certain combinations of physical and ecological conditions. An association of plants with similar tolerances and preferences is a vegetation community. On a regional scale, similar vegetation communities can be grouped into habitat types. A habitat type may include several vegetation communities which share certain plant species, have similar vegetation structure, and occur under similar physical and ecological conditions.

The classification of habitat types is helpful in identifying the functional role of vegetation. In particular, wildlife is often associated with particular habitat types which provide nesting, shelter, or feeding areas. In any habitat type wildlife utilization can be predicted. Certain habitat types support other habitat types; examples of this include the export of nutrients or the retention of surface water. Thus, habitat type identification can be used to identify ecological relationships.

This section presents a description and mapping of the major habitat types of the CBJ. Habitat type descriptions were developed from several major data sources. Selkregg (1975) contains general plant lists and habitat descriptions for Southeast Alaska. More detailed information on certain vegetation associations was derived from Viereck, et al. (1980). Hulten (1968) was utilized as the nomenclature authority for plant species. Habitat type and vegetation association descriptions for intertidal wetlands is derived from Watson (1979) and from site reconnaissance of several areas in the City and Borough of Juneau.

General small-scale habitat type mapping is available in Selkregg (1975) but was not useful in this study. Two sources of existing data were used in habitat type mapping. Color infrared aerial photographs (scale 1:60,000) were used to derive the habitat type map for the study area and as a secondary source for the focus areas. The primary source of data for the focus areas was U.S. Forest Service Timber Type maps at a scale of 1:31,680. These maps indicate habitat types indirectly from forest types and potential forest productivity (USFS, n.d.).

EXISTING CONDITIONS

The City and Borough of Juneau is located in the Coastal Mountains Physiographic Province of Southeastern Alaska (ADF&G, 1978). The province is dominated by the massive, glacier-covered mountains of the Boundary Range. Foothills, straits, and islands west of the range exhibit many textures of glacier controlled

topography. Much of the area is characterized by shallow soils on glaciated bedrock or alluvial deposits. The thin soils generally exhibit heavy leaching of nutrients due to heavy rainfall.

The maritime climate of the area is characterized by moderate temperatures, high precipitation and frequent overcast. Large snow accumulations occur at higher elevations. Although most slopes are heavily forested, snow accumulations may limit vegetation. Microclimatic variation can also be radical in places due to abrupt elevation gradients.

Lush forests dominate much of the area, in response to high rainfall, providing much of Alaska's merchantable timber. Evidence of geologic, as well as climatic, impacts on vegetation is common. Avalanches and landslides often disrupt vegetation. Erosion and sediment deposition due to flooding are also significant. In contrast, human disturbances are generally restricted to localized areas, although the level of impact may be more intense.

Ten major habitat types have been identified and mapped for this study (Figures V-l and V-2). While a more detailed classification of vegetation types is possible, and in some areas has been completed, this classification is appropriate to the requirements of this study. Habitat types which are recognized in the CBJ include:

- . Forest
- . Shrubland
- . Alpine Tundra
- . Muskeg
- . Freshwater Marsh
- . Salt Marsh
- . Intertidal Flat
- . Marine Waters
- . Rivers and Lakes
- . Urban

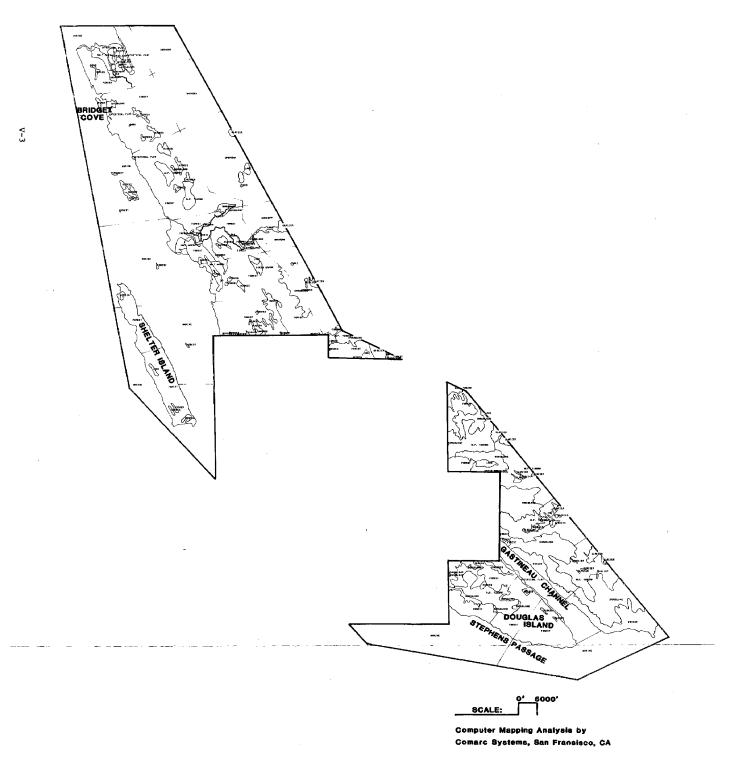
A detailed description of each habitat type follows.

FOREST

Coniferous forest is the climax habitat type in the region and a common habitat type at low elevation in the CBJ. Western hemlock is the dominant species, with Sitka spruce sub-dominant throughout most of the region; in moist sites and floodplains, Sitka spruce may dominate. Western red cedar is common in poorly drained areas and mountain hemlock may dominate near timberline. Lodgepole pine, Alaska cedar, birch, and black cottonwood may also be found in scattered sites. The understory generally consists of a dense growth of devil's club, mountain ash, and mountain maple, with numerous ferns, herbs, grasses, mosses, and lichens at ground level. Stands of forested habitat are heavily interspersed with muskeg habitat (Figure IV-1). The areas of

STUDY AREA

VEGETATION/HABITAT



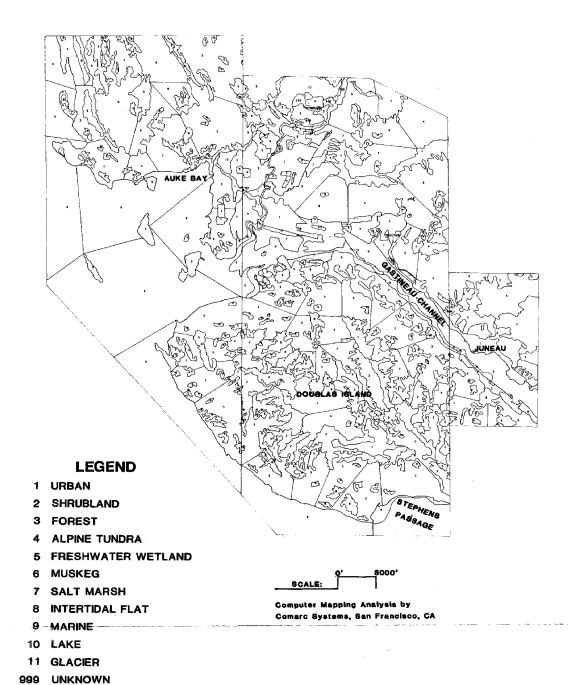
Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

FOCUS AREA

V-4

VEGETATION/HABITAT



Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

N P forest habitat type within the CBJ include the Lemon Creek and Salmon Creek Valleys; much of low elevation coastal belt and valleys of Douglas Island, and all low elevation areas form the Mendenhall Valley.

Removal of the original stands of coniferous forests, either by logging or natural mechanisms reinitiates succession in the forest community. Typically even-age stands of trees develop from young seedlings and mature at similar rates for several hundred years. During this period, the conifers form a dense canopy that reduces the light in the understory which remains sparsely vegetated. Old growth forests are mature in terms of successional stage, but over-mature with regard to merchantable timber. As individual trees in the forest grow older, more young conifers are found in the understory and midstory, where openings from dead or fallen trees provide light.

Deciduous forest stands are not prevalent, but they do occur throughout the study area, primarily in the Herbert River, Eagle River, and Mendenhall Valleys. Alder and black cottonwood are the dominant species. They are also common on recently exposed moraines.

SHRUBLAND

Dense brush is usually indicative of disturbance or new land in areas where forest would otherwise be expected. Shrub habitats are generally defined as woody vegetation less than 20 feet in height. In old clearcut or burn areas, brush represents a successional stage preceding the reestablishment of forest. In river valleys, brush may represent an early successional stage following flooding or realignment of the river channel; in these areas, either evergreen or deciduous forest may be the climax habitat type. Brush marks avalanche and landslide chutes on steep slopes; in these areas regular disturbance here precludes the establishment of forest habitat. Shrubland is the predominant habitat type in the Gold Creek Valley, an area south of Juneau, steep valley walls on Douglas Island, and other locations.

In cutover or burned forest lands, immature forest tree species such as western hemlock and Sitka spruce form a shrubland habitat type. Disturbed places where new substrate has been deposited, such as landslide areas, recent alluvial deposits, or recently glaciated areas, are usually colonized by alder or willow. Black cottonwood and Sitka spruce are often the next invaders. Similarly, in recurrent snowslide areas, alder colonizes open soils and survives the physical stress of avalanches. Some small conifers, mostly mountain hemlock and Alaska cedar, may survive in more protected areas of slide zones and are common in subalpine zones. These areas also are vegetated by a variety of shrubs, including Sitka alder and blueberry.

ALPINE TUNDRA

At high elevations, generally above 2,500 feet, the climate is too harsh and often the soil too shallow to allow establishment of forest vegetation. The areas generally are covered by snow for most of the year. In these alpine areas, a variety of low growing shrubs, perennial grasses, and herbs occupy the thin, rocky soils, blooming quickly during the short summer. Dwarf willow and birch are common, along with crowberry, blueberry, and mountain heather. Meadow areas may contain saxifrages, gentians, and other herbaceous species, while wet sites may be dominated by a variety of sedges.

MUSKEG

Scattered throughout the forest and alpine areas are local patches of muskeg, the most prevalent and widespread wetland type in the region (Figures V-1 and V-2). High rainfall and low temperatures inhibit the decay of organic material in poorly drained sites. The resulting wet organic soils support communities usually dominated by mosses and sedges. Labrador tea, skunk cabbage, and other saturation-tolerant species may also be prevalent. When trees are present, scattered lodgepole pine and Alaska cedar occur. Numerous patches of muskeg occupy a large portion of the coastal belt of Douglas Island, and are also found in the forested elevations along the coast from the Mendenhall Valley to Echo Cove.

Important ecosystem functions are attributable to muskeg wetlands as a result of their soil characteristics and water retention capacity. The highly organic, acid soil supports an unusual flora and fauna that are adapted to muskeg conditions. Certain wildlife may forage in muskeg and specialize in this habitat in certain seasons. Because muskeg retains water within the peat substrate, it may have the effect of releasing water and maintaining stream flows in certain watersheds.

FRESHWATER MARSH

The predominant physical characteristic of this habitat type is frequent to seasonal inundation. Freshwater marshes often form large meadows on flat terrain near rivers and lakes; examples are found in the Mendenhall Lake and floodplain area, the Herbert-Eagle River area, Salt Lake, and Echo Cove. Sedges, bulrushes, common marestail, and horsetail are common. In shallow ponds, bladderwort, pondweeds, and ditchgrass may be found. Many of these species will tolerate brackish conditions and may occur where tidal action affects groundwater conditions. The productive vegetation and the aquatic habitat of freshwater marshes provide for a variety of mammals such as furbearers and birds, particularly certain species of waterfowl that nest and feed in and around marshes. In some locations, freshwater marshes may

fulfill important hydrological or water quality functions by detaining and storing storm water flows and acting as a filter for water contanimants.

This habitat type is classified as a wetland according to the definition used by the U.S. Army Corps of Engineers.

SALT MARSH

This habitat type includes both saline and brackish marshes of estuarine areas. Frequent tidal inundation and saline or brackish conditions are key factors which control the distribution of the marsh vegetation. These areas are commonly referred to as estuarine grassflats, but The term marsh is used in this report to emphasize that these areas are wetlands. The most extensive salt marshes are fpimd at the mouth of the Mendenhall, Eagle, and Herbert Rivers where intertidal areas have been formed by the deposition of sediments. Many of these salt marsh areas are dominated by brackish conditions due to the influence of freshwater from rivers. Other salt marshes are found at Echo Cove, Salt Lake, Lemon Creek, and along the north shore of Douglas Island (Figures V-1 and V-2).

A distinctive pattern of vegetation zonation occurs in salt marshes in response to elevation gradients, and the consequent variations in salinity and frequency of inundation. Under saline conditions, seaside arrow-grass, saltwort, seaside plantain, alkali grass, and spike rush are the lowest marsh species. Hairgrass, redtop, reedgrass, and common silverweed occupy higher elevations. Above these is the sedge meadow, which may be the most common salt marsh type in the study area; much of the Mendenhall estuary is dominated by this community (Watson, 1979). A community of hairgrass, redtop, reedgrass, and silverweed is often referred to as high marsh. The transition zone between high marsh and grassland may be dominated by ryegrass, especially in areas of sandy substrate.

Certain salt and brackish marshes in estuarine areas have been noted for their high vegetative productivity, important contribution to the marine habitat, and extensive use by both aquatic and terrestrial animals. High productivity creates a dense vegetative cover in many marsh types, and senescent vegetation contributes vast amounts of essential detritus to marine food webs. Bear, waterfowl, deer, other birds, and many species of commercially important fish utilize this habitat type at various times of the year.

This habitat type is classified as a wetland according to the definition used by the U.S. Army Corps of Engineers.

INTERTIDAL FLAT

Flats of silt, sand, and mud occur at elevations below the salt marsh habitat type in estuarine areas. Deposition of sediments at the major river mouths has led to the accretion of delta fronts. The instability of the substrate and the low elevation restricts vegetation communities. Often only sparse algal communities colonize the intertidal flats. In some protected bays, eelgrass communities occupy subtidal and very low intertidal elevations. Eelgrass beds are found in Auke Bay and may occur in other shallow subtidal locations.

MARINE WATERS

The marine habitat type includes the open water of bays, channels, coves, and shorelines where narrow intertidal beaches occur. Thus, all intertidal and subtidal habitat, with the exception of intertidal flats at river mouths and salt marshes, are considered part of the marine habitat type.

The shallow water and shoreline portions of this habitat type may be vegetated with algal communities and, in places, eelgrass. Gravel and sand substrate on the moderate-to-high energy beaches in the study area are generally devoid of macroalgae. However, on rocky or large cobble intertidal and shallow subtidal substrate, algae can attach and withstand moderate-to-high wave energy.

As in salt marshes, tidal fluctuation results in zonation of attached species. At the highest levels, rockweed predominates; at lower elevations a variety of red, green, and brown algal species may dominate. Perhaps the most notable algal communities occur at depths of greater than 25 feet and less than 60 feet of these are predominantly large brown kelp.

A very important part of the marine community are the unattached phytoplankton. These microscopic algal species form the base of many marine food webs. Diatoms are the predominant phytoplankton and are typical of the open ocean community of the North Pacific. These plants can be highly productive, particularly in coastal inlets and fjords where winds induce mixing and nutrient replenishment of the upper water column. They are responsive to a variety of local conditions and species composition may vary in different areas. Seasonal variations in population are extreme since many phytoplankton have high growth periods in spring and through the summer. High production in one species (Gonyaulax catenella) results in the "red tide" phenomenon which may lead to accumulation of a toxin in shellfish (Selkregg, 1975).

RIVERS AND LAKES

Lakes in the area exhibit a wide range of physical conditions. The lakes at the toe of glaciers, such as Mendenhall, are highly turbid from glacial suspended sediment. This restricts plant growth except in the very shallow lake marshes. Several small lakes that are unaffected by glaciers occur within the forested area. The clarity and chemistry of these waters result in very different plant and animal communities.

Lakes contain phytoplankton, attached algae, submerged plants, and emergent marsh plant communities. In glacial and non-glacial lakes, emergent plants such as those described in the section of freshwater marshes may occur along shorelines composed of fine sediments. This vegetation type is contained within the lake designation where it is not of sufficient size to be mapped separately. In non-glacial lakes, a dense community of pondweed, yellow pond lily, and water milfoil may occur at moderate depths.

Like the lakes in the study area, the rivers exhibit two types of physical characteristics. Glacial fed watersheds, such as the Mendenhall, Herbert, and Eagle drainages, are characterized by short, turbid rivers. Streams and rivers where glacial input is insignificant are less turbid and have a lower discharge than the glacial fed rivers. These include Fish Creek on Douglas Island, and Lemon, Salmon, Montana, Cowee and Davies Creeks on the mainland. Each of these types of watercourses have different biotas; the fish populations are discussed in the Fisheries and Wildlife section.

URBAN

This habitat type is comprised of residential, commercial, and industrial areas. In the CBJ, the centers of urban habitat type are Juneau, Douglas, West Juneau, Lemon Creek, and the Mendenhall floodplain (Figure IV-1). Scattered residential development occurs along coastal areas elsewhere within the study area. Port and harbor structures, mines and gravel pits, and unvegetated scraped or filled areas are also found. Generally, native vegetation is absent with the exception of scattered large trees and weedy plant species. Vegetation is often sparse, non-native, and managed primarily for aesthetic purposes.

ENDANGERED SPECIES

The Endangered Species Act of 1973, administered by the U.S. Fish and Wildlife Service, states that federal agencies must carry out programs to preserve endangered species. No known Alaskan plants are included on the list of actual and proposed endangered and threatened plant species developed under the act. A list of candidate threatened and endangered species has been developed by the state (Murray, 1980). Plant species on this list are recog-

nized under the Act for listing as threatened or endangered plants and, therefore, are not afforded any protection under federal legislation. They may be included after further study.

Murray (1980) lists a sedge (<u>Carex plectocarpa</u>) as a candidate species for Alaska. It grows in alpine meadows and has been collected on Mt. Robinson within the study area; it also occurs in Montana. A recent survey, however, did not verify this species in the locality (<u>Emeral</u>, personal communication, 1982). It is generally found at high elevations outside of the CBJ.

DEVELOPMENT CONSIDERATIONS

A prevalent habitat type and important economic asset in the CBJ is the coniferous forest. Much of this habitat is within the Tongass National Forest where the harvest is controlled by the U.S. Forest Service. The scale and location of the harvest could have some influence on intrastructure needs such as port facilities, housing, and others. Timber harvest can also influence downstream habitats and other resources within the CBJ with increased runoff and sedimentation, or other negative impacts of logging.

Shrub habitats indicate that secondary succession has been initiated by a major disturbance to the climax forest habitat type. Certain disruptive events recur, but with unpredictable frequency. Shrub habitats in recurrent avalanche, landslide, or flood zones indicate the need for careful consideration of possible unstable conditions which should be evaluated prior to development. Shrub habitats which also occur where disturbance is not recurrent, such as on glacial moraines and logging areas, do not necessarily indicate an area unsuitable for development.

Muskeg is a widespread habitat type in the CBJ. Several large patches are found along the coastal belt of Douglas Island and north of the Mendenhall Valley. The saturated, poorly drained soils associated with this habitat type severely limit development in regard to supporting foundations or drain fields. In certain watersheds, the hydrological function of water detention and release may maintain or increase stream flows in dry seasons. An assessment of the importance of muskeg in maintaining water supply requires detailed hydrological studies of watersheds. Muskeg also provides a diversity of vegetation within the more expansive forest area, and thus may provide habitat for some unusual or highly specialized wildlife species.

Freshwater marshes and salt marshes are both unique and limited habitat types commonly known as wetlands within the CBJ. Traditionally considered wastelands, their valuable contributions to both aquatic and upland ecosystems have been recognized in recent years. These include wildlife habitat, food web contributions, and water quality enhancement. State and federal regulations

attempt to minimize losses associated with development activities. Physical limitations associated with saturated soils and ecosystem values also lead to the conclusion that these habitats should be avoided as sites for development. They occur in the estuarine and floodplain areas of the CBJ.

Intertidal flats form a closely interacting ecosystem with adjacent marine waters, and support a diversity of fish and waterfowl, marine mammals, and other aquatic life. Due to the relative scarcity of these flats, and their importance to commercial and sport fisheries, development activities should be carefully evaluated in relation to their potential costs, impacts, and benefits.

The importance of estuarine salt and brackish marshes and intertidal shorelines has been recognized by various resource agencies within Alaska. Under Phase I and II of the Juneau Coastal Management Program Studies, Berners Bay and Sweetheart Flats were proposed as Areas Meriting Special Attention (AMSA). While these areas are outside the study area, a brief review of existing data supports this suggestion. Other estuarine areas in the CBJ such as Eagle-Herbert River Delta, Echo Cove, Auke Bay, and portions of the Gastineau Channel, are important areas that merit consideration of habitat and natural resource values prior to development.

Evaluations of wetlands should be made on a site-specific basis to identify ecosystem values. Where wetlands or other habitat types demonstrate a significant value, development proposals should be considered carefully. A wetlands habitat evaluation should include an investigation of such aspects of ecosystem function as vegetation productivity and density, diversity of wildlife utilization, wildlife abundance, hydrologic interactions, including groundwater or surface water recharge, and water purification. Cultural values such as recreational, land use development patterns, and aesthetic values should also be considered.

Discharge of fill material into wetland areas is regulated by the U.S. Army Corps of Engineers. Under the jurisdiction of Section 404 of the Clean Water Act, the Corps must issue a "404" permit before any discharge or fill can occur. Before the application of a developer (public or private) can be processed, a precise delineation of the wetland boundaries must be made to determine the limit of Corps' jurisdiction. As part of the "public interest review" of the permit application, a site-specific analysis of the ecological functions and cultural values described above must be performed. As part of the review, a "Notice of Consistency" with the Coastal Zone Management Act must be made prior to issuing a 404 permit. The purpose of this notice is to assure the proposed development is consistent with federal and state coastal management policies. After the CBJ develops a District Coastal Management Program consistent with the guidelines of the Alaska Coastal Management Program, it will serve as the basis for the consistency review.

Section VI

Fish and Wildlife

VI. FISH AND WILDLIFE

INTRODUCTION

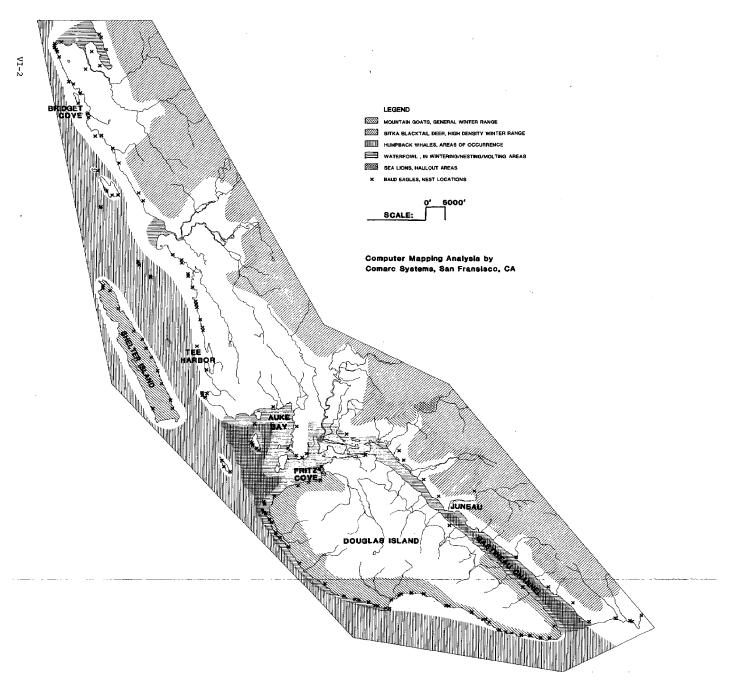
This discussion focuses on commercial, game, and other socially and economically important species of fish, shellfish, birds, and terrestrial and marine mammals in the CBJ. Each species or group of species uses certain habitat types for reproduction, feeding, and resting; these may vary throughout the year. Some animals with general habitat type requirements are found throughout the area, while others have specific requirements which restrict their movements. Critical habitat areas are those which are: (1) essential for the continuation of that species in the area by providing nesting or feeding habitat; (2) known to support a high population density and to be heavily used by the species; and/or (3) essential for an "economic" import species. Economic importance includes subsistence, sport, and commercial values. species also exhibit non-quantified values in terms of aesthetic or ecological importance and may be protected by federal or state laws.

Two maps have been prepared to illustrate the fish and wildlife resources and facilities in the area.

- Wildlife (Figure VI-1)
 - Mountain goats general winter range
 - . Sitka blacktail deer high density winter range
 - . Humpback whales area of occurrence in normal years
 - Waterfowl wintering/nesting/molting areas
 - . Sea lions haulout area
 - . Bald eagles nest locations
- Fisheries (Figures VI-2 and VI-3)
 - Salmon, steelhead trout, and Dolly Varden species approximate distance of upstream migration and lake occurrence
 - Important resident fish populations lake and stream of occurrence
 - . Coastal shore fishing general location along shore
 - . Herring spawning general location along shore
 - Herring overwintering general area of maximum abundance
 - Clam beds frequently harvested beds
 - Boat launching and mooring facility locations
 - . Hatcheries facility locations

Primary data sources on the fish and wildlife resources in the CBJ include previously mapped information prepared by the Alaska Department of Fish and Game for the Alaska Coastal Management Program; other mapped data (which uses the above maps as primary

STUDY AREA

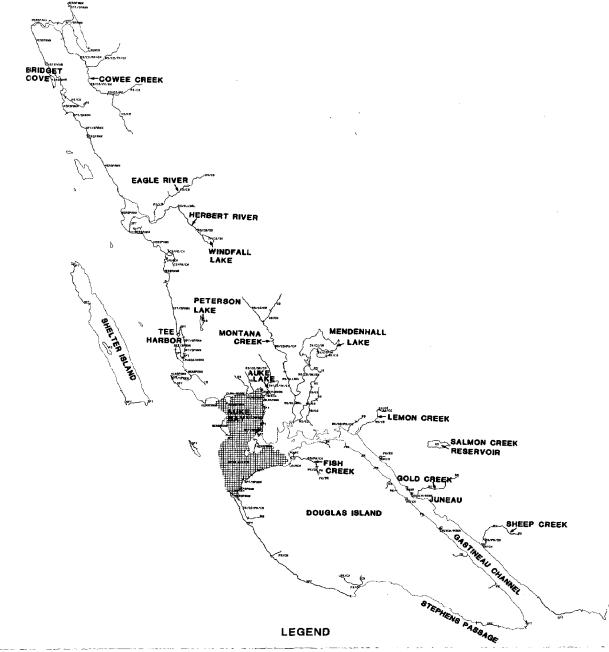


Full-size copies of this map are available at the CBJ Planning Department.

STUDY AREA

VI-3

FISHERIES



APPROXIMATE LIMITS OF UPSTREAM MIGRATION:

CO -COHO SALMON

CH -CHUM SALMON

PK -PINK SALMON

SK -SOCKEYE SALMON

ALLSAL-ALL OF THE ABOVE SALMON

Computer Mapping Analysis by Comarc Systems, San Francisco, CA

RS -RESIDENT SPORT FISH POPULATIONS
DV -OVERWINTERING DOLLY VARDEN CHAR

HERSPAWN -IMPORTANT HERRING SPAWNING AREAS

HERR WINTER -OVERWINTERING HERRING

SPT -IMPORTANT SHORE OR COASTAL SHOREFISHING

CLAM BEDS -FREQUENTLY HARVESTED CLAM BEDS

- FISH HATCHERY
 - + BOAT LAUNCHING FACILITY
 - O BOAT MOORAGE FACILITY
 - * BOAT MOORAGE AND LAUNCHING FACILITY

Full-size copies of this map are available at the CBJ Planning Department.

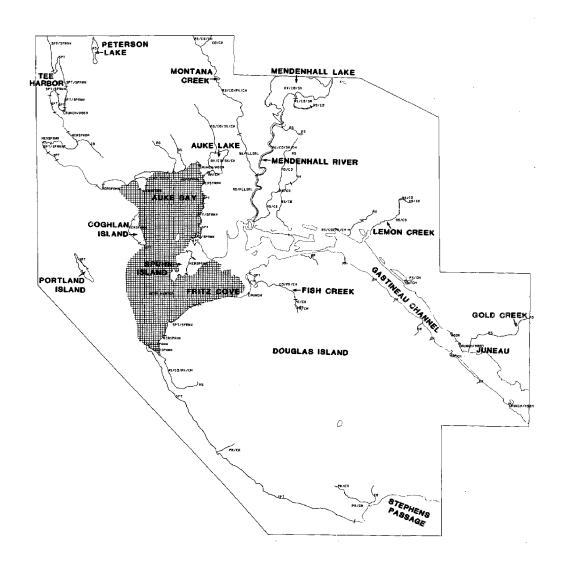
COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

COGAN/SHAPIRO

SCALE:

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Juneau, Portland, Seattle



LEGEND

APPROXIMATE LIMITS OF UPSTREAM MIGRATION:

CO -COHO SALMON CH -CHUM SALMON

PK -PINK SALMON

SK -SOCKEYE SALMON

ALLSAL-ALL OF THE ABOVE SALMON



RS -RESIDENT SPORT FISH POPULATIONS
DV -OVERWINTERING DOLLY VARDEN CHAR
HERSPAWN -IMPORTANT HERRING SPAWNING AREAS
HERR WINTER -OVERWINTERING HERRING
SPT -IMPORTANT SHORE OR COASTAL SHOREFISHING
CLAM BEDS -FREQUENTLY HARVESTED CLAM BEDS

- ☐ FISH HATCHERY
- + BOAT LAUNCHING FACILITY
- O BOAT MOORAGE FACILITY
- ⊕ BOAT MOORAGE AND LAUNCHING FACILITY

Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA



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source); reports and documents prepared by state and federal agencies (i.e., Alaska anadromous stream catalog); and personal communications with numerous individuals directly involved with the management, harvest, and protection of fish and wildlife resources in the Juneau area. These sources are listed in the References section of this document.

Not all resources are identified on the maps. For certain wild-life species having broad distribution in the CBJ, such as black and brown bear, locations of critical or important habitat have not been identified. Also, there are smaller streams and limited areas which provide important habitat for many other fish and wildlife forms. In addition, many fish and wildlife species not shown on the maps or discussed in this section have ecological and indirect economic value because of their relationships to other plants and animals. Resources in this category are finfish, shellfish, waterfowl, seabirds, and marine mammals in salt and fresh water environments, and terrestial birds and mammals. These are reviewed below with reference to habitat type, resource type, and resource utilization in the CBJ.

EXISTING CONDITIONS

RESOURCE TYPES

Fish and Shellfish

Marine Fish and Shellfish

General Description. Numerous fish and shellfish (invertebrates) are found in the marine waters and intertidal areas of the CBJ. Bottom fish, such as rockfishes, sablefish, lingcod, and greenlings, reside in predominantly rocky bottom areas and are taken in the commercial and sport fisheries. Rockfish or snappers are found over rock piles and reefs at depths to about 60 fathoms. The common varieties are the yelloweye (red snapper), canary, and quillback. They are not as abundant in the area as other species (Squire and Smith, 1977).

Other common marine finfish occurring in the CBJ are surf perch, sculpins, smelt, flatfish, and herring. The largest flatfish species, the Pacific halibut, occurs over fairly smooth bottom areas at depths from 25 to 35 fathoms. Halibut are taken by sport fishermen off the southern tip of Shelter Island, in the Stephens Passage area and at other locations along the coastline. Herring spawn and overwinter in the area as shown on the fisheries maps (Figures VI-2 and VI-3). Herring spawn demersal eggs which adhere to eelgrass, kelp, and sometimes rock and trash; intertidal and shallow subtidal habitats are important to their spawning success.

A number of salmon and trout species occur in the marine waters of the Juneau area. All are anadromous (migratory) species which make extensive use of the coastal waters as juveniles or smolt and pre-spawning adults. Some species such as Dolly Varden char, cutthroat trout, and chinook and coho salmon are found in the coastal waters of the area year-round. Estuaries and intertidal flats are critical habitat to pink and chum salmon. These species spend much of their first year after hatching in shallow nearshore waters (Kron, 1982).

The marine shellfish or invertebrate species that inhabit the area include a large number of grops ranging from sponges and sea anemones to crabs, octopus, and sea urchins. Two of the groups are particularly significant because of their direct economic importance: decapod crustaceans (crabs and shrimp) and pelecypods (bivalves). These and other species comprise a necessary food source for fish and shellfish and constitute essential links in the marine ecosystem in the area.

Crabs, scallops, and clams are also common; shrimp are uncommon. Areas where crabs and scallops are seen in near-shore waters include:

- . Auke Bay Recreational Area Dungeness Crabs
- Tee Harbor and Amalga Harbor King Crabs
- Sunshine Cove Scallops, King and Dungeness Crabs (O. Clair, 1982)

Nearshore flats and channels are important rearing areas for the juvenile phases of crabs and shrimp.

The intertidal bivalves such as little necks (Protothaca staminea), butter clams (Saxidomus giganteas), pink necks (Spisula polynema) and softshell clams (Mya truncata and Mya arenaria) occur in many beach areas; the most well known areas are near Indian Point and Auke Nu Cove, and Amalga Harbor. Bay mussels (Mytilus edulis) are found in rocky areas or attached to piling. There are no oysters in the area.

Critical Areas. All estuaries, intertidal flats, and island and mainland intertidal shorelines are critical habitat areas for many marine species. A large number of the fish and shellfish taken in the commercial, subsistance and recreational fisheries use these areas for spawning, and larval and juvenile development. Some animals (e.g., clams and mussels) remain in estuaries and intertidal regions as adults. Others (e.g., salmon and herring) make seasonal migrations. Other critical habitat types are subtidal rocky bottom areas and kelp beds. These areas may support substantial populations of bottom fish and generally have higher plant and animal diversity than sand or mud-covered bottoms. No specific bottom or kelp habitat types have been mapped.

Freshwater Fish

General Description. The fisheries resources of the lakes and rivers of the area include the following: sockeye salmon (Oncorhynchus nerka), coho salmon (O. kisutch), pink salmon (O. gorbuscha), chum salmon (O. keta), Dolly Varden char (Salvelinas malma), steelhead/rainbow trout (Salmo gairdneri), cutthroat trout (Salmo clarki), stickleback (Gasterosteas aculeatus), and sculpin or cottids (Cottus spp.)

Coho, pink and chum are the most common species, and pink salmon probably occur to some extent in all streams. Sockeye generally are found only in those systems which have tributary streams to lakes, although they will spawn in lake gravels. Sockeye occur within the area in the Mendenhall, Auke and Windfall lake systems. Salmon spawning streams, streams with significant resident fish populations, and lake fisheries are illustrated in Figures VI-2 and VI-3.

Dolly Varden char are found in about every stream and lake in the Juneau area (Reed and Armstrong, 1971), and cutthroat trout are nearly as common. A large wild stock population of steelhead trout occurs in Peterson Creek (north of Auke Bay) (Jones, 1981). This species is found infrequently in other streams in the area. Small numbers of chinook salmon (O. tshawytscha) are found in some streams. In addition, the state has planted brook trout (Salvelinas fontinalis) in the Salmon Creek reservoir (Marriott, 1982).

Certain anadromous fish species are afforded protection under the State of Alaska Anadromous Fish Act (AS 16.05.870). These include the five species of Pacific salmon, Dolly Varden, steelhead trout, Arctic char, sheefish, and whitefish. These species are the highest portion of Alaska's commercial, sport, and subsistence fisheries for anadromous fish.

The duration of the freshwater phase for anadromous fish is species-specific. Timing of spawning, incubation, and rearing is generally similar between streams. An example for Auke Creek is shown in Figure VI-4. Pink and chum salmon migrate to saltwater immediately after emerging from incubation gravels. Coho salmon and steelhead trout remain in fresh water for one to two years before migrating to the sea. Sockeye salmon spend one, two, or three years in fresh water; in some cases, they may become permanent lake residents or kokanee. Windfall, Auke, and Mendenhall Lakes are also important habitat for overwintering populations of Dolly Varden char. Other lakes which are blocked to anadromous fish by barriers such as waterfalls often support good populations of resident or introduced fish (i.e., rainbow and cutthroat trout, Dolly Varden char, and Eastern brook trout). Shelter Lake on Shelter Island and Peterson Lake at the headwaters of Peterson Creek are landlocked lakes identified as prime candidates for further study and possible stocking with coho salmon (Smith and Kron, 1980).

ACTIVITIES OF ANADROMOUS FISHES IN AUKE CREEK FIGURE VI-4

	JAN	FEB	MAR	APR	MAY	NOC	JUL	AUG	SEP	ОСТ	NOV	DEC
SALMON			1110300000				***************************************		111111111111111111111111111111111111111	18118111811181		111111111111111111111111111111111111111
SOCKEYE	•	•	•							•	0.000	• • • •
PINK												
CHOM												
		•							Ì	• • • •		•••••
0H00												
		•••••	• • • • • •								• • • • • •	•••••
CHAR												
DOLLY VARDEN						1						
TROUT												
CUTTHROAT			1									

LEGEND
ADULT MIGRATION
INCUBATION
INCUBATION
FRY MIGRATION
SMOLT MIGRATION

<u>Critical Areas</u>. Certain water bodies contain critical anadromous and resident fish resources. They are included in this study if they meet the following criteria:

- . Water bodies with diverse salmon stocks
- . Lake systems
- . Water bodies with high fish population potential
- Water bodies with special fisheries resources (e.g., a fish species uncommon in other areas)

Specific resources judged by ADFG staff to be particularly important in the Juneau area include:

- Fish Creek one of the largest freshwater sport fisheries in the CBJ.
- . Auke Creek large sockeye salmon run, as well as other species. Water is used to support NMFS hatchery and laboratory.
- . Montana Creek a diverse salmon fishery and a good Dolly Varden char run.
- . Steep Creek moderate to good salmon runs.
- . Peterson Creek (mainland) only sizable steelhead run accessible to sport fishermen.
- . Windfall Lake productive salmon runs.
- . Cowee-Davies Creeks moderate to good salmon runs.

Urban development, mining activities, and water withdrawals or diversions have altered a number of streams in the area. Seriously degraded streams include the following:

- Gold Creek once supported a large chum salmon run. The most suitable spawning area is now channelized.
- Lemon Creek landfill and sand and gravel removal have reduced and disturbed available fish habitat; stream still supports small runs.
- Jordan and Duck Creeks portions of both were dry during the summer of 1982; coho runs have been very good, although loss of stream flow eliminates rearing habitat of this species.

Other streams and lakes also support anadromous fisheries and contribute to the total economic value of these resources. They are also afforded protection under the State Anadromous Fishery Act (Kron, 1982; Reed, 1982).

Fisheries Development

General Description. Hatcheries and stream enhancement programs have been established in the area to augment natural production; they include Salmon Creek (Northern Southeast Regional Aquaculture Association), Kowee and Sheep Creeks (Douglas Island Pink and Chum), and the Auke Creek Hatchery (NMFS in cooperation with the Territorial Sportsmen Association and ADF&G). These facilities are shown in Figures VI-2 and VI-3.

Fish holding and rearing facilities also have been operated on Fish Creek and the upper Mendenhall Valley (Marriott, 1980 and 1982). The Mendenhall facility, however, is still considered to have potential for production of Dolly Varden char and trout (Kron, 1982).

Hatchery production consists of chum, pink, and Coho salmon. At the Salmon Creek hatchery, the Twin Lakes pools are used to hold coho and chum salmon prior to release. This is a joint NMFS, ADF&G, and Salmon Creek hatchery effort using NMFS developed "floating raceway" technology. Under this agreement, the hatchery will also produce fish for a recreational fishery in Twin Lakes (Fetters, 1982; Heard, 1982).

Various attempts are underway to augment natural anadromous stocks in certain streams with introductions of steelhead and cutthroat trout. Steelhead smolt were planted in Montana Creek in 1976, and the wild stocks in Peterson Creek are considered good for hatchery production (Jones, 1980 and 1981).

Most of the effort to manage and enhance fisheries resources has been directed at controlling the use of the resource and managing the habitat. Habitat management has focused on three major areas:

- Designation of the most important areas which should be set aside for fish production only;
- Minimization of impacts on salmon systems where other land uses occur; and
- Protection and maintenance of existing natural anadromous fish stocks.

There are no specific regulations to protect stream and lake resources in the area other than a general authority of state officials to oversee projects affecting streams or lakes (Northern Southeast Regional Planning Team, 1982). The Alaska Department of Fish and Game has the primary authority for monitoring construction in stream and lake beds, and limited authority in shoreline areas. The latter is mainly to recommend actions related to development activities prior to construction and enforcing fisheries and statutes after development (Reed, 1982). Other state agencies with jurisdiction in related facets

of fisheries resource management are the Departments of Environmental Conservation and Natural Resources; federal agencies with permitting or review authority include the National Marine Fisheries Service, Fish and Wildlife Service, Environmental Protection Agency and the Army Corps of Engineers.

Critical Areas. Salmon and trout hatcheries require substantial volumes of high quality freshwater. Water resources in the area that are critical to the operation of existing hatcheries include Cowee, Sheep, Salmon, and Auke Creeks, and Auke Lake.

Maintenance of adequate flows and exceptional water quality characteristics are important.

Habitat management is the principal tool of agencies to maintain stream, lake and marine resources. They pay particular attention to protecting estuaries and wetlands, and freshwater shoreline and bottom areas. Critical habitat areas are managed on a site-specific basis. Areas meriting special consideration are identified in a vegetation and habitat types summary of this report.

Commercial, Subsistence, and Sport Fisheries

General Description. Fish and shellfish are harvested in commercial, subsistance and recreational fisheries. In general, the catch and effort in the area are moderate and there are few well-defined critical fishing areas. The following fisheries occur in the nearshore area:

- Salmon
 Gill Net high intensity north of Benjamin Island
 Troll low to moderate intensity north of Tee Harbor
 Purse Seine little to no activity
- Herring
 Auke Nu Cove to Echo Cove
- Bottom fisheries (except halibut)
 Rocky bottom areas in entire area (mainly sport catch)
- Halibut Entire area
- King and Tanner Crab
 North of Auke Nu Cove into Berners Bay, including Shelter Island
- Dungeness Crab
 Coastal embayments north of Auke Bay

(Source: Landingham, 1982; O'Clair, 1982; and Squire and Smith, 1977)

Principal sport shore and nearshore fishing areas, and a major clam harvest site in Auke Bay, are shown on the fisheries maps (Figures VI-2 and VI-3). Shore and skiff fishing is popular in the area. Most shore fishing is for Dolly Varden char, although some cutthroat and steelhead trout, and pink, coho, and chinook salmon are also taken. Most of the fishing occurs around the mouths of streams and accessible beaches. One distinction of the area's sport fishery is the large number of sport fishermen who also fish commercially.

Most of the rivers and lakes in the area are open to sport salmon and/or trout fishing. Those with fisheries for resident species are shown on the fisheries maps (Figures VI-2 and VI-3). The Juneau-Douglas Island road system provides access to many of the streams.

Commercial/recreational boating facilities have been constructed at a number of locations (Figures VI-2 and VI-3). Boats are docked at public or private marinas, moored in front of private residences, or trailered.

Wildlife

Birds

Waterfowl (Geese, Ducks, Swans)

General Description. The diverse waterfowl population utilizes all aquatic habitat areas throughout the year. Protected bays, rivers, streams, lakes, and wetlands provide their habitat needs. In marine and estuarine areas, most waterfowl feed in the zone that occurs between the high tide line and a depth of 60 feet; thus the shoreline is an important component of waterfowl habi-Large numbers of migrating waterfowl pass through southeast Alaska in spring and fall. Migrant species depend on resting and feeding habitat along the migration route. This habitat is particularly critical in years when conditions for migration are difficult (Selkregg, 1975). Many species are represented by both resident and migratory populations. A total of 16 species of waterfowl breed in the region (Table VI-1). The nesting habitat for most species consists of wetland and riparian habitats such as found in the Mendenhall Valley, Auke Lake, and other lakes, streams, and marshes (King, personal communication, 1982).

Critical Areas. Nesting, wintering, molting, and feeding and resting areas are critical habitat needs for waterfowl. In the CBJ, these include Echo Cove, Eagle River Delta, Mendenhall Flats, Gastineau Channel, and the waters along the west coast of Douglas Island (Figure VI-1).

TABLE VI-1

EXPECTED WATERFOWL BREEDING IN CBJ*

mallard American widgeon green-winged teal pintail shoveler

gadwall greater scaup buffiehead canvasback harlequin red-breasted merganser common golden eye Banau's golden eye Canada goose trumpeter swan

*Note: These species are known to breed in mainland areas of southeast Alaska and, therefore, can be expected to nest in appropriate habitats in the CBJ.

Source: ADF&G, 1973.

In addition, ADF&G (1973) has proposed the Gastineau Channel and Mendenhall Flats complex as key waterfowl habitat areas that are of state and national concern which should be identified as critical wildlife habitat.

Activities of the timber industry may be detrimental to water-fowl. The accumulation and decomposition of wood wastes in bays has been known to alter aquatic animal populations on which certain waterfowl often forage. Pulp mill effluent has been linked to waterfowl mortality.

The marsh between Sunny Point and the Juneau Airport provides an important feeding habitat for a resident Canada goose population. This population of about 400-500, ranges in certain months to Glacier Bay, but winters and nests in the vicinity. In the winter and spring, the vegetation of the Mendenhall Flats near Sunny Point provides an important food source to the geese after the harsh winter. These birds are an aesthetic as well as a hunting resource (King, personal communication, 1982).

Bald Eagles

General Description. Bald eagles are year-round residents in southeast Alaska. During the breeding season, which begins in spring and continues through the summer, they nest in large, old growth trees near the marine shoreline and feed in open water and intertidal flats. Eagles are also commonly seen in sanitary landfills. Headlands and points are preferred nest locations where large areas of feeding habitat can be observed (Robards & Hodges, 1976). During their lifetimes, bald eagles build or maintain several nests but use only one each year. In the winter, they occupy marine shoreline areas, but many migrate to coastal rivers to feed on salmon carcasses.

The bald eagle is the national bird and an important attraction to tourists. The U.S. Bald Eagle Protection Act of 1940 protects

the birds, their nests, and eggs from human exploitation or disturbance. Under the Endangered Species Act, this species is not listed as an endangered or threatened species in Alaska, as it is in most other states

Critical Areas. The area critical to bald eagles is the nesting and wintering habitat. Nesting areas include islets, headlands, and other marine shorelines with old growth forest within 200 yards of the water. Known sites are shown on Figure VI-1. High density nesting areas include the shoreline from Echo Cove to Eagle River and the west coast of Douglas Island. Intertidal areas and open water are important feeding areas in summer (Robards and Hodges, 1976), and salmon spawning rivers are valuable in winter. Important feeding areas heavily used by bald eagles include the Mendenhall Wetlands and intertidal areas (Hodges, personal communication, 1982).

Their Nesting habitat is susceptible to disturbance and is decreasing, due to logging and shoreline development. Suitable nest trees and roosting sites are lost as old-growth forests are removed. The presence of humans in shoreline areas also may deter nesting or feeding, and bald eagles are sometimes forced to nest in less preferred habitat.

Eagles are particularly sensitive to noise, although minor auditory disturbances alone do not seem to disturb them. Construction equipment, chainsaws, and other equipment have been known to cause them to abandon specific locations. Timing and proximity to eagle habitats of noise-generating activity are matters to consider when development occurs.

Peregrine Falcon

General Description. Three subspecies of the Peregrine falcon are recognized. Two nest in the Alaskan interior and winter in southern latitudes. Their migration route is not well established but may follow the coastline. The third subspecies, Peale's peregrine falcon, nests in seacliff areas in southeast Alaska, wintering within and just south of the breeding range. The Peale's subspecies nests on the outer coast and islands and feeds primarily on seabirds (ADF&G, 1978).

While the Peale's peregrine is not endangered, the other two subspecies are listed as endangered under the Endangered Species Act (Emeral, personal communication, 1982). Alaska is the only state where significant numbers of peregrine falcons are known to nest.

Critical Areas. No critical areas have been identified for peregrine falcon nesting or wintering in southeast Alaska for the two endangered subspecies (Emeral, personal communication, 1982). For the Peale's peregrine falcons, important nesting and foraging habitat also are areas where seabirds and waterfowl concentrate.

Terrestrial Mammals

Furbearers

General Description. The furbearing mammals of commercial significance in the CBJ include mink, land otter, and marten. Beaver, muskrat, wolves, and wolverine are also sought under certain conditions. Most trapping is done to supplement incomes of residents of the CBJ, as few people depend on this activity for subsistence (Zimmerman, personal communication, 1982; Selkregg, 1975).

Of the most important furbearers, land otter and mink are most closely associated with aquatic habitats. Most mink populations occur within a narrow band of habitat which includes the forest-beach interface. Denning habitat consists of rock crevices and root cavities above suitable beaches. Land otter inhabit streams, lakes, and coastal shorelines. They forage extensively in marine intertidal communities on invertabrate and bottom fish. Land otter denning sites occur on forested points of land around shallow bays (ADF&G, 1978).

Marten are residents of coastal forests where they forage for small mammals. Marten are also known to forage on intertidal shorelines for marine invertebrates. Wolverine and wolves are widely distributed and will occur in all areas of the CBJ.

Critical Areas. Because furbearers are a diverse group, several habitat types are important to these animals. Shoreline areas where suitable denning sites occur are critical habitat for both land otter and mink. For marten, coastal forests are important for breeding and feeding. Logging activities can be expected to reduce marten habitat, and reduce marten densities as a result (ADF&G, 1978).

Coastal areas, and stream and lake shorelines appear to support the highest density of furbearer populations. No specific critical areas have been identified; however, denning sites for mink and land otter could be adversely affected by road construction and other development-related activities in shoreline areas.

Mountain Goats

General Description. Mountain goats are a game species that are taken by sports hunters throughout their range. The habitat of mountain goats extends from sea level to ridge tops. During summers, goats frequent the high elevations of local mountains and feed on grasses, sedges, and low shrubs of alpine tundra and meadows. In winter they migrate to low elevations where winter food sources such as shrubs are available. In some cases, goats utilize areas near sea level for winter foraging (ADF&G, 1973).

Critical Areas. The wintering range of the mountain goat is the most important portion of their habitat. Development in low

elevation areas has the potential to impact the wintering range of goats. The location of important wintering ranges has not been precisely determined, although studies are in progress to determine goat wintering areas that may be critical to the survival of certain populations (Zimmerman, personal communication, 1982). Generally, goats winter between the 1,000 foot elevation and timberline and as low as sea level from Berners Bay to Mendenhall Glacier (ADF&G, 1979). Other goat winter range occurs between Mendenhall and Bishop Point (Zimmerman, personal communication, 1982).

Sitka Black-Tailed Deer

General Description. This important game species ranges from high elevation habitats in the summer to sea level in winter. The summer range includes alpine tundra and timberline meadows. In the winter, deer depend on forested areas at low and high elevations for winter forage which consists of shrubs and herbs. Severe winter conditions affect mortality and population fluctuations (ADF&G, 1973). Recent studies (for example, see Wallmo and Schoen, 1980) have shown that old growth, serally mature forests provide the optimum combination of forage and cover to sustain deer populations in severe winters when habitat resources are limited. Neither clearcuts nor second-growth forests provided adequate cover or forage during winters of mild to severe snowfall. During winters of lower snow accumulations, the distribution of deer is more extensive; this provides for the recovery of browse plants in serally mature forests.

Critical Areas. The maintenance of winter habitat is critical to deer populations. In order to sustain deer populations in mild to severe winters, old-growth serally mature forests are important. Sufficient areas of old-growth forests are required to prevent over-concentration of deer in winter ranges which may lead to habitat deterioriation and increased predation (Matthews and McKnight, 1982). Deer winter throughout the coastal area in the CBJ. The upper elevation limit of this winter range is about 1,000 feet, but may be higher in winters of light snow accumulation (Zimmerman, personal comunication, 1982). Population densities in old growth coastal forest would be greatest during high-snowfall winters; with lower snowfalls, the winter distribution of deer would be more dispersed.

Douglas Island supports a large deer population, due to the combination of extensive high elevation habitat and forested winter range. The total available acreage and quality of the winter range are major factors which control the population.

High density winter habitat use is known to occur on the west slope of Douglas Island (Figure VI-1) (ADF&G, 1973). Also noted as valuable winter range is the remaining unpopulated portion of the Douglas Island coastline at low elevations; only the presence of people restricts deer winter use (McKnight, personal communication, 1982).

On the mainland, one major wintering area which supports a large deer population is the south facing slopes of low elevation forest in the Lemon Creek Valley. It provides the appropriate wintering habitat for animals in the Lemon Creek watershed and Heintzleman Ridge.

Black Bears

General Description. These animals use a variety of habitat types throughout the year, as their movements coincide with the seasonal appearance of food resources. Herbaceus vegetation found in marshes and other low elevation grasslands are important forage in the spring. Later in the summer, black bears move to high elevation alpine areas to eat berries; salmon are an important food source in the fall.

Critical Areas. The range of black bears extends throughout the area from sea level to the alpine tundra and thus, the is not delineated on Figures VI-2 and VI-3. No critical habitat areas for black bear have been identified.

Black bears are attracted to garbage. Within the CBJ, the effect of development has been to increase the interaction and conflicts between humans and black bears. The conflicts could be largely eliminated if proper garbage disposal practices were employed.

Brown Bears

General Description. Nearly all habitat types are used by brown bear during the year. In early spring, skunk cabbage is an important food source found in low, wet sites. Estuarine habitats, such as fresh water and salt marshes, are used extensively in late spring and early summer. Brown bears rely heavily on spawning salmon populations in fall but may also forage on berries and other alpine vegetation. Thus, marshes and salmon spawning streams are critical components of brown bear habitat.

Critical Areas. Brown bears are disinclined to use acceptable habitat near human settlements. They are, however, known to occur throughout the CBJ, and are occasionally observed in Lemon Creek, Montana Creek, Cowee-Davies, and Herbert River (Zimmerman, personal communication, 1982). Their population density is low, and no critical areas are known (McKnight, personal communication, 1982).

Marine Mammals

The waters from Berner's Bay to Bishop Point are extraordinarily rich in marine mammals. In various seasons, a relatively large number and high density of Dall porpoise, harbor porpoise, harbor seals, Stellar sea lions, minke whale, killer whale, and humpback whales occur in the waters of the CBJ. A variety of other species also inhabit these waters at lower densities; the most notable species are the humpback whale and stellar sea lion.

Humpback Whales

General Description. The humpback whale is an endangered species under the Endangered Species Act. A large proportion of the eastern Pacific Ocean humpback whale population inhabits southeast Alaska in the summer. About 100 humpback whales summer in the waters of Lynn Canal and Stephens Passage. Most of these animals spend at least some portion of the year in the waters of the CBJ (Brooks, personal communication, 1982). They feed in the marine waters of Lynn Canal, Favorite Passage, Auke Bay, and Stephens Passage. A small number of this group also spends the winter in the area and has been observed feeding on herring schools in Gastineau Channel as far north as the bridge (Brooks, personal communication, 1982).

Critical Areas. The extent of critical habitat as determined by the National Marine fisheries service (NMFS) is indicated on Figure V-1. NMFS considers the area inhabitated by humpback whales to be critical habitat.

A significant risk to whales is posed by hydrofoils, particularly through collisions (Brook, personal communication, 1982). The location of hydrofoil transportation routes should consider whale habitat.

Conventional marine traffic has been implicated in recent years as affecting humpback whale behavior. Some researchers believe that noise from tour boats in Glacier Bay National Monument is responsible for fluctuations in the level of their utilization of the bay. Studies are being conducted to assess these facators.

Stellar Sea Lions

General Description. This species has been observed throughout southeast Alaska and is common within the waters of the CBJ, including Auke Bay and Gastineau Channel. Open waters near river and stream mouths (i.e., Eagle River), all shoreline areas with herring spawning, and herring wintering grounds are important feeding habitat for sea lions. Many of these animals are part of the approximately 300 to 500 sea lions that utilize a hauling area on Benjamin Island. This haul out (not a breeding rookery) is stable and has a long history.

Critical Areas. The sea lion haul out on Benjamin Island is a critical habitat for the stellar sea lion (see Figure VI-1). It represents a high population density of this species and one of only 19 known sea lion haul outs and rookeries in southeast Alaska (ADF&G, 1973). Coastal regions in the CBJ will be critical feeding habitat for sea lions, particularly in locations where herring, salmon, and other fish become concentrated during spawning and overwintering.

HABITAT TYPES

Aquatic

The major aquatic habitat types in the CBJ are coastal marine waters, estuaries, intertidal flats, fresh and saltwater wetlands, rivers, lakes, and streams. (Also see vegetation habitat type descriptions in Section V_{\bullet})

Marine waters support diverse populations of fish, shellfish, marine mammals, and birds, and contain a large number of specific habitats ranging from narrow intertidal sand to rocky bottom areas to open waters subdivided by salinity or temperature gradients.

Estuaries in marine waters are influenced by the runoff from streams and rivers. They exhibit marked fluctuations both in salinity and tide level, and often contain large wetland areas drained by tidal channels. Estuaries provide a protected nursery for the young of many species of finfish and shellfish. They also are important staging areas for salmon and searun trout migrating in and out of river systems.

Intertidal flats provide an interface between the sea and the land. They support a wide variety of organisms ranging from seaweeds and eelgrass, barnacles, and clams to gulls and shorebirds. Deer and mountain goats may occasionally forage on the intertidal shorelines.

Wetlands are those aquatic lands which are either intermittently covered by water or strongly influenced by adjacent waters. They may include freshwater marshes on flat terrain near rivers and lakes and brackish intertidal marsh lands. The muskeg is the most common of the non-tidally influenced freshwater wetlands, with a restricted source of drainage and little inflow or outflow. Wetlands are important for several reasons. They provide habitat for many plant and animal species and serve as a pollution filtration system, and in some cases as a natural flood control system.

Rivers, lakes, and streams are major features of the CBJ uplands. Most of the drainages are small, and some have headwater lakes. These resources are discussed in detail in the Geology/ Hydrology section. Anadromous and resident fish species are found to some extent in all streams and lakes. Streams and lakes with anadromous fisheries identified by the Alaska Department of Fish and Game (ADFG) in the Juneau area are listed in Table VI-2.

Migration data have been plotted for salmon species found on the lakes and streams, and were derived from Coastal Zone Management maps completed by the Alaska Department of Fish and Game in 1978-1979. The approximate limits of upstream migration are indicated for each species. Migration barriers include water-

CREEK, RIVERS AND LAKES IDENTIFIED AS HAVING ANADROMOUS FISHERIES IN THE CBJ

TABLE VI-2

Stream or Lake	Approximate Location	Catalog #
Sawmill Creek	Berners Bay, East	115 20 052
Bessie Creek	Yankee Cove	115 10 028
Unnamed Creek	Sunset Cove	115 10 023
Cowee Creek	Echo Cove West	115 20 062
Eagle River	Amalga Cove	111 50 005
Herbert River	Amalga Cove	115 50 006
Unnamed Creek	Amalga Cove	111 50 007
Windfall Lake	Herbert River	_
Peterson Creek	Near Shrine Island	111 50 010
Peterson Lake	Peterson Creek	111 50 010
Shrine Creek	Near Shrine Island	-
Tee Creek	Tee Harbor	
Lena Creek	Lena Beach	-
Auke Nu Creek	Auke Nu Cove	111 50 035
Waydelich Creek	Auke Nu Cove	111 50 037
Bay Creek	Auke Bay, Inner	
Lake Creek	Auke Lake	111 50 044
Lake II Creek	Auke Lake	111 50 046
Auke Creek	Auke Bay, Inner	111 50 042
Auke Lake	-	111 50 042
Montana Creek	Mendenhall River, North	111 50 052
McGinnis Creek	Montana Creek	-
Mendenhall Lake	Upper Mendenhall Valley	-
Nugget Creek	Mendenhall Lake	-
Steep Creek	Mendenhall lake	111 50 056
Glacier Lake	Upper Mendenhall Valley	-
Morraine Lake	Upper Mendenhall Valley	-
QT Lake	Upper Mendenhall Valley	-
Louie Lake	Upper Mendenhall Valley	-
Norton Lake	Upper Mendenhall Valley	
Crystal Lake	Upper Mendenhall Valley	-
Dredge Lake	Upper Mendenhall Valley	-
Dredge Lake Creek	Upper Mendenhall Valley	111 50 058
Marshall Ponds	Upper Mendenhall Valley	_
Mendenhall River	North Gastineau Channel	111 50 050
Duck Creek	Lower Mendenhall Valley	111 50 060
Jordan Creek	Lower Mendenhall Valley	111 50 062
Switzer Creek	Gastineau Channel NE	111 40 007
Lemon Creek	Gastineau Channel NE	111 40 010
Vanderbilt Creek	Gastineau Channel NE	111 40 012
Twin Lakes	Gastineau Channel NE	-
Salmon Creek	Gastineau Channel NE	111 40 015
Salmon Creek Reservoir	Salmon creek	-
Gold Creek	Gastineau Channel, East	-
Snowslide Creek	Gastineau Channel, East	_
Sheep Creek	Gastineau Channel, East	111 40 028

Stream or Lake	Approximate Location	Catalog #
Little Sheep Creek Peterson Creek (Outer Point Creek)	Gastineau Channel, East Douglas, NW	- 111 50 075
Elevenwide Creek	Douglas Island, North	_
Cove Creek	Douglas Island, North	_
Fish Creek	Douglas Island, North	111 50 069
Cropley Lake	Fish Creek	111 50 069
Ninemile Creek	Douglas Island, North	-
Johnson Creek	Douglas Island, NE	_
Hendrickson Creek	Douglas Island, NE	111 40 058
Neilson Creek	Douglas Island, NE	111 40 096
Falls Creek	Douglas Island, East	111 40 094
Eagle Creek	Douglas Island, East	111 40 094
Grant Creek	Douglas Island, East	111 40 091
Kowee Creek	Douglas Island, East	_
Lawson Creek	Douglas Island, East	111 40 089
Bear Creek	Douglas Island, East	_
Ready Bullion Creek	Douglas Island, West	111 40 086
Nevada Creek	Douglas Island, West	111 40 082
Hilda Creek	Douglas Island, West	111 40 070
Unnamed Creek	Douglas Island, West	111 40 069

Primary Sources: Alaska Department of Fish and Game, 1975 Reed and Armstrong, 1971 falls and dams, extreme stream slopes, lack of suitable spawning habitat, and insufficient flow.

Pink salmon are particularly abundant and occur in nearly all freshwater drainages. Other salmon species, such as sockeye, coho, and chum also are found. Many types of plants and animals other than fish are also dependent on fresh water. Examples include beaver, muskrat, waterfowl, some shore birds, and song birds.

These habitat types have been identified on the vegetation maps (Figures V-1 and V-2), the fisheries maps (Figures VI-2 and VI-3), and the base maps (Figure VIII-1 and VIII-2).

Terrestrial Habitats

A complete description of terrestrial vegetation and habitat types is found in Section V, Vegetation Habitat Types. The purpose of this discussion is to indicate wildlife utilization of each vegetation habitat type as mapped in Figure V-1.

An important aspect of wildlife habitat is the ecotone or edge where two habitat types interface and intergrade. This often is called the edge effect and is valuable to many animals that utilize different habitat types to fulfill different life functions. The diversity of animals which use both habitats is greater than in either habitat type. An example of the edge effect is provided by furbearers, such as like mink which live in forest areas near water and forage at the shoreline. The most important habitat type boundaries in the CBJ are shoreline and riparian areas where forest or other habitat types adjoin marine, river, or lake habitats.

Forests are used by most of the game non-game animals in the region. Resident mammals of forests include certain rodents and shrews, bats, and some furbearers such as marten. Large game mammals such as deer, bear, and mountain goat, live in forests at some time during each year. A wide variety of birds, including hawks and owls, woodpeckers, swifts, swallows, and numerous small perching birds, also is found.

Following a disturbance such as fire, logging, or natural geologic events, forest types undergo succession. Variation in successional stage is an important factor in habitat quality; species composition and diversity may be different through succession. Certain species rely on old-growth, serally mature forests (Section V). Sitka black-tailed deer and mountain goat winter in forests where old-growth forests provide optimum conditions. Bald eagles require old, mature trees in shoreline forests for nest sites. Certain perching birds and spotted owls are dependent on old-growth forests. Forests of the Douglas Island coastal belt and Lemon Creek (Figure V-1) have been identified as important deer wintering habitat. Eagle nest sites

(see Figure IV-1) occur in forested coastlines throughout the CBJ.

Shrublands habitat types, dominated by deciduous shrubs and herbaceous vegetation, provide abundant browse for deer, goat, and a variety of small mammals and furbearers. Deciduous shrublands support a large number of passerine species that forage among the shrubs for insects and fruits. Due to avalanches and other geologic disturbances, shrublands often are interspersed with forests. In these areas, there is a notable diversity of habitat types and the extent of edge is generally great.

Alpine tundra is inhabited by several resident taxa such as small mammals, marmots, furbearers (wolverine and ermine), and ptarmigan. Most animals spend only summer months in the alpine zone; these include black and brown bear, Sitka black-tail deer, mountain goat, and a variety of passerine birds. The alpine tundraforest edge is important to many of these species that forage in the alpine vegetation but seek cover in the forest.

Muskeg, like shrublands, is widely interspersed with the forest habitat type; as a result, the extent of edge effect and habitat type diversity is greater than that in unbroken forests. Within the muskeg, occasional open water, shrubs, and herbaceous vegetation fulfill the habitat needs of a number of animals. Most notably, black and brown bear and Sitka black-tail deer forage on muskeg vegetation in various seasons, and certain bats feed extensively in muskeg (Selkregg, 1975). Much of the muskeg habitat type in the area occurs on federal lands. Within the CBJ, extensive muskeg is found within the coastal belt of Douglas Island and between Mendenhall Valley and Echo Cove.

Freshwater marshes support waterfowl nesting and feeding; other birds, such as swallows, red-wing, blackbirds, and long-billed marsh wrens; several specialized small mammals; and certain furbearers like mink, muskrat, and beaver. Deer occasionally feed in marshes. The combination of aquatic conditions and high plant productivity creates an abundant habitat resource for herbivores and insectivores, thus providing the basis for extensive food webs. Freshwater marshes occur in the Herbert, Eagle and Mendenhall floodplains, and other scattered locations.

Salt marshes, which include all vegetated intertidal communities typical of estuaries, are one of the most important habitat types in the CBJ. These areas are important components of the habitat of many waterfowl species, brown bear, black bear, and certain small mammals. Numerous other species use salt marshes extensively in some seasons, including Sitka black-tailed deer, shore-birds, bald eagles, and passerine birds. A productive environment for invertebrates, marshes attract many insectivorous bird species, bats, and shrews. Salt marshes indirectly support portions of marine food webs because of their high productivity and interaction with marine waters via tides.

Intertidal flats are used extensively by waterfowl and shore-birds, especially during seasons of migration. These birds are highly dependent on this resource and are its most conspicuous inhabitants. Bald eagles also forage along shorelines and in intertidal flats. The invertebrate community of the sediments is probably the most important component of this habitat type. At low tide shoreline, foraging species include mink, land otter, and weasels. At high tide, many animals of the marine system forage in intertidal zones and, in turn, support marine mammal populations of seals, sea lions, and porpoises.

Marine waters contain a wide range of plant and animal species. The productive planktonic community supports a food web of small fish on which the marine mammals and fish prey. Land otters also forage on benthic organisms and fish in shallow marine habitats. A large diversity of waterfowl and seabirds utilize marine waters extensively for feeding and resting. For many species of waterfowl, the shallow (less than 60 feet in depth) marine waters are most important for feeding. Seabirds are found throughout the marine environment, feeding and resting.

Rivers and lakes are freshwater bodies that support invertebrates and fish. These animals provide the basis of a food web that includes terrestrial mammals and birds. Waterfowl are dependent on lakes and, for some species, rivers for feeding and resting habitat. Some seabirds, such as gulls and terns and several shorebirds use freshwater bodies or their shorelines extensively. Of the mammals that rely on lakes and rivers, muskrat and beaver inhabitat these areas during all stages of their life cycles. Land otter and mink also use lakes and rivers in addition to marine areas. Brown bear and, to a lesser extent, black bear are dependent on rivers in the fall salmon runs as a critical food resource. Major habitats in the CBJ include Auke and Mendenhall Lakes, and the Eagle, Herbert and Mendenhall Rivers.

Shoreline and riparian habitats include the interface of upland with wetland and salt and freshwater habitat types. Such edge areas are very diverse and abundant in animals. Many species are tied closely to shoreline and riparian habitats as they nest or seek protective cover in upland habitats types but forage in marine, intertidal, or freshwater lake and river types. Waterfowl are dependent on shorelines of lakes, streams, and wetlands for nesting; this provides accessibility to aquatic feeding and brooding habitats. Mendenhall and Auke Lakes, and the riperian areas of the Mendenhall and Herbert-Eagle floodplains, are productive freshwater riparian areas. In marine environments, the shoreline and adjacent areas to a depth of 60 feet are important feeding areas. Shorebirds feed at the shoreline of water bodies, but do not utilize either the upland or aquatic habitats extensively. Bald eagles and peregrine falcons nest only near shorelines and prefer locations with visibility over large, marine expanses. Bald eagles feed on marine organisms of open water and shoreline areas. The Mendenhall Flats have been identified as important bald eagle, shorebird and waterfowl habitat. Many passerine birds nest in nearshore upland areas and forage on insects and vegetation of productive aquatic habitats. Of the mammals, furbearers depend extensively on shorelines. Land otter, mink, and, to a lesser extent, marten forage in shoreline areas of both marine and freshwater. The shoreline from Echo Cove to Eagle River is used extensively by furbearers. In the fall, at nearly every salmon spawning river or stream, black and brown bears forage for salmon along the shoreline and in the water.

Urban areas with human and domestic animal populations are low quality habitat for many of the animals discussed in this section. In particular, Sitka black-tailed deer, bald eagles, and brown bear are adversely affected by the proximity of urban areas. Black bear are a potential nuisance to human populations since they are attracted to garbage and may become dangerous. In contrast, some species thrive in urban areas where potential predators have been eliminated or feeding habitat has been enhanced; these include certain perching birds and rodents.

Terrestrial Habitat Areas - VCU Rating

The ADF&G has recently evaluated U.S. Forest Service lands in the Tongass National Forest to identify units of habitat and rank their value to fish and wildlife. The purpose of this effort was to provide information for timber harvest planning in light of the dwindling old-growth forest resource. Individual drainage-size compartments were formulated; they included upland and neighboring waters and were called Value Comparison Units (VCU). Each VCU was evaluated using biological, human use, land and forest type diversity, and percentage of high volume timber. The scoring of each criteria was summed for each VCU, and three management classes were created by dividing the range of scores. The recommended management strategies for each class are as follows:

Class I - no further timber harvest activity

Class II - moratorium on timber harvest until field evaluations can be completed

Class III - those areas of relatively low value in which timber harvest can occur with the least perceived impact.

Table VI-3 relates the VCU wildlife score and recommended management class to each VCU in the study area.

The highest VCU wildlife scores are given to the shoreline and adjacent coastal forest from Echo Cove to Eagle River and south to the Mendenhall Valley. The Herbert and Eagle River Drainage are assigned a moderate value. High wildlife scores are also noted for the coastal forest from Lemon Creek to Point Salisbury. Concentrated populations or prime habitats are identified for marine mammals, water birds, and black bear in these areas. Bald

Table VI-3

ALASKA DEPARTMENT OF FISH AND GAME VCU RATING AND MANAGEMENT RECOMMENDATION FOR THE TONGASS LAND MANAGEMENT PLAN

<u>vcı</u> 1	Wildlife VCU Score	Recommended Management Class
MAINLAND		
Cowee-Davies Drainage Echo Cove to Eagle River South Fork Cowee-Boulder Creek	Low Very high Low	I I II
Herbert and Eagle River Eagle River to Mendenhall Valley, including Peter Creek Drainage	Moderate High	II
Montana Creek Drainage	Low	I
Mendenhall Lake Drainage	Low	III
Heintzleman Ridge	Low	III
Upper Lemon Creek	Low	III
Lemon Creek to Point Salisbury	High	I
Grindstone-Rhine Drainage	Low	III
DOUGLAS ISLAND		
East Shore, Douglas Island	Low	II
Fish Creek Drainage	Very low	I
Northwest Shore, Douglas Island	Low	ΙΙ
Hilda Creek	Moderate	II
Southwest Shore, Douglas Island	Low	ΙΙ

These descriptions are generalized form a small-scale mapping of the recommended management classes for the Tongass National Forest (available from Don McNight, ADF&G, Juneau)

 $^{^{2}}$ Rating based on wildlife use of each VCU

³Includes non-wildlife criteria such as human use and timber volume. Class II areas include all areas not assigned to Class I or III.

eagle and furbearers are important populations in the area from Eagle River to Echo Cove. On Douglas Island, a moderate score is assigned for the Hilda Creek area in the central west coast of the island.

The recommended management classifications depend on other criteria, and do not correspond exactly with VCU wildlife scores. In general, the mainland shoreline, coastal zone, and adjacent lowland forested zones are recommended for Class I. Exceptions are the Eagle-Herbert River Drainages, South Fork Cowee and Bolder Creek drainages, Mendenhall Lake Drainage, Heintzleman Ridge, Upper Lemon Creek, and Grindstone-Rhine Creeks. On Douglas Island, only the Fish Creek drainage is considered Class I with the remainder recommended as Class II.

DEVELOPMENT CONSIDERATIONS

FISH AND SHELLFISH

Stream and Lake Resources

Most streams and lakes in the CBJ contain anadromous fish. Provisions of the Anadromous Fish Act (AS 16.05.870) apply to any development affecting these streams. The act gives the state authority to review plans and procedures to ensure that proposed development will have no harmful effect on the fishery or habitat. Procedures to mitigate potential harmful impacts can include the timing of construction to avoid interference with the fish, or practices which would have minimal effect upon spawning and rearing areas.

The State of Alaska places great emphasis upon the maintenance of stream habitat for fish spawning, incubation, and rearing, rather than the use of hatcheries. Planting of hatchery-reared stocks to augment depleted natural stocks is generally not an accepted method, and is rigidly controlled and monitored.

Some streams in the Mendenhall Valley and urban areas have been degraded by development which has filled, graded and channelized waterways, and intercepted ground and surface water supplies. This has led to loss of fish habitat and drainage and flooding problems in streams such as Gold, Jordan, and Duck Creeks.

The potential for upland development and water withdrawals have an impact on the degree of habitat monitoring and protection required for any water body. Certain resources which supply high quality water for hatcheries (e.g., Auke Lake, and Sheep, Cowee, and Salmon Creeks) also could be adversely impacted by such development.

State fisheries laws do not protect stream resources from land practices that may, indirectly, adversely impact the fisheries. Maintenance of a conservation easement for building setback is a possible approach, especially when combined with measures to insure minimum stream flows, reduce siltation and sedimentation, and prevent blockage of runs. Measures to control storm water quantity and quality, in particular, need better definition (Marriott, 1982).

All stream alterations, such as channelizing, diversion, and streambed changes, are reviewed, approved and monitored by the ADF&G and the City and Borough of Juneau. This includes plans for gravel and water removal, filling floodplains and wetlands, and development that may lead to erosion and sedimentation problems in waterways.

Maintenance of streamside vegetation and application of methods to control erosion and sediment have beneficial impacts on the quality of water and the availability of food for juvenile salmonids. The habitat that borders streams and lakes also provides a unique resource for water-dependent animals, such as many furbearers and waterfowl. Protection of this habitat is possible by imposing development restrictions or designating management areas within a defined width of the stream corridor and surrounding lakes. The State of Alaska provides no guidelines for defining stream corridor widths or lake shoreline buffer areas. As an example, the Shoreline Management Act of the State of Washington (RCW 90.58) defines a management zone which extends landward for 200 feet in all directions from the ordinary high water mark of streams and lakes, and the associated wetlands. Development is not prohibited within this zone, but quidelines are included which may specify the sizing and density of projects and construction methods. The stream and lake shoreline habitats of the CBJ are similar to many of those included within the State of Washington shoreline designation and may be applicable.

Development restrictions may be necessary to prevent continued loss of habitat for Auke, Montana, Steep, Peterson, and Cowee-Davies Creeks, and Windfall Lake, as well as the west bank of the Mendenhall River.

Water withdrawals from streams or associated groundwater resources can cause flow deficits and adverse impacts on instream fishery use. This has been documented in a water supply study for the University of Alaska Auke Lake Campus (KCM, 1978) and in recent low flow conditions observed in Jordan and Duck Creeks (Kron, 1982; Reed, 1982).

Marine Resources

Many intertidal flats and island and mainland intertidal shorelines are important spawning and rearing habitats for economically valuable fish and shellfish. Particularly productive areas are adjacent to stream mouths, in protected embayments and channels, and inshore from shallow and/or rocky bottoms. Development in these areas should be limited to those activities which have a minimal impact on intertidal bottoms and which are water dependent.

Shellfish harvesting and shorefishing is somewhat restricted in the Juneau area by the lack of well-defined public access, particularly in Auke Bay. The timing of clam harvests is greatly restricted by paralytic shellfish poisoning (PSP)—a recurring natural biological (Synder, 1982). Regardless of the problem, proper methods of water quality control (especially for septic tank discharges) are critical if the shellfish harvest is to expand.

Conflicts in boat moorage and launching facilities occur in the following areas:

- . Auke Bay. The issue is the recommended construction of a breakwater to expand the number of slips; problems identified include increased pollution in an important spawning, rearing, and migrating area for finfish and shellfish (Landingham, 1982).
- . Echo Cove. This area is popular with sportsmen. The main issue is development of the Cove which may preclude boat launching and easy access to Berners Bay.

Development considerations in subtidal areas are usually minimal unless dredging or dredge material disposal occurs. Marine disposal of dredged material is infrequently in the Juneau area—most is used as upland fill. Dredge spoil disposal would not be allowed in shallow protected areas, mouths of streams, and important algae or shellfish beds (Reed, 1981).

WILDLIFE

Important Wildlife Resources

Because of their federal protection, bald eagles require special consideration in development planning. They are sensitive to human activity and noises and require adequate buffer zones. The U.S. Fish and Wildlife Service recommends nonbuildable buffer zones of at least 330 feet around known eagle nest sites and retention of shoreline habitat in their vicinity to a depth of 1/8 mile. This is affected negatively by heavy pressure to log old-growth forests. Shoreline development in the CBJ also has raised the concern of resource agencies as eagles now are forced to choose suboptimal nesting habitats near expanding developed areas. Development in estuaries and wetlands, such as the Mendenhall Flats, also may adversely affect eagle feeding habitat.

Black bears pose a different type of problem for development. In addition to the potential adverse impacts of development on their

habitat, dangerous conflicts between black bear and humans have resulted from the attraction of black bears to garbage in populated areas. Development should minimize the intrusion of sources of conflict and to minimize the destruction of bear habitat.

Waterfowl use extensive portions of the marine, estuarine, and freshwater habitats and adjacent uplands. Concentrated use and breeding occur in the wetlands and shorelines (to 60 feet in depth) of Echo Cove, Eagle River Delta, Mendenhall Flats, Auke Bay, and Gastineau Channel. The principal threat to waterfowl is development in wetlands and shorelines. A substantial portion of the Mendenhall Flats is designated as a wildlife reserve. This area also receives heavy recreational use by local hunters. Other locations such as the Eagle River Delta and Auke Lake provide resting areas during hunting season.

Sitka black-tailed deer is an important game species whose populations are limited by wintering habitat. Optimal wintering areas have been defined on Douglas Island and around Lemon Creek. These areas are important in sustaining populations at existing levels. Old-growth forest is a critical component of wintering habitat. Its loss or the intrusion of human activities and domestic animals into this wintering habitat will reduce the population levels of deer. Development in deer wintering habitat must be carefully considered due to the significant effect on deer populations that results from human activities.

Marine mammals are common in the CBJ. Development of the marine environment, or in areas connected to marine waters, has an impact this resource. There are two species of particular importance. Of principal concern is the population of humpback whales, an endangered species, which has been observed in all marine waters of the CBJ. In the absence of a precise definition of habitat needs, the entire area should be considered critical habitat for this species. Humpback whales may be affected by excessive noise from marine traffic. Actual physical injury to the whales and potential danger to humans is posed by hydrofoil vessels that may be considered a future transportation mode. Planning for cultural development in and affecting the marine ecosystem should consider the potential conflict with humpback whale habitat needs and areas of concentration.

Also of concern is a population of Stellar sea lions which ranges throughout the CBJ and has a major haulout area on Benjamin Island. This location should be protected from the direct impact of human development. Indirect effects on the marine ecosystem, such as a reduction in food prey species (fish), also affect sea lions.

Important Wildlife Areas

Phases I and II of the Juneau Coastal Management Studies have recommended specific locations within the CBJ as Areas Meriting Special Attention (AMSA) which are noted for their wildlife

resource and habitat value. Sweetheart Flats and Berners Bay are proposed as AMSAs. Each area supports abundant wildlife resources such as waterfowl, marine mammals, and terrestrial mammals.

As noted previously, in the recent ADF&G evaluation of the Tongass National Forest, fish and wildlife values were assigned to units of habitat (Value Comparison Units or VCU) to provide back-ground for timberland management planning. The CBJ was divided into 15 VCU's, of which three received high or very high scores and two received moderate scores. The area of Echo Cove and south to the Eagle River Delta was rated very high because of the presence of bald eagles, black bears, waterbirds, marine mammals, and furbearers. From Eagle River south to Lemon Creek (including Peterson Creek and the Mendenhall Valley) and from Lemon Creek to Point Salisbury, high ratings were also assigned. Marine mammals, waterbirds, and black bears were identified. The Eagle and Herbert River Valleys and the Hilda Creek area on Douglas Island received a moderate VCU score. Based on wildlife values and other criteria such as human use and timber volume, each VCU was assigned to one of three management classes. Much of the mainland coastal forest was recommended as a Class I area. the most restrictive class (Table VI-3), where further timber harvest activity would be prohibited. On Douglas Island, the Fish Creek Drainage received a Class I recommendation.

Estuarine habitat should be protected from development throughout the study area. This habitat is recognized for its importance to black bear, brown bear, waterfowl, bald eagles, other terrestrial mammals and birds, and fisheries resources. The biological productivity of estuaries forms the basis for complex marine and terrestrial food webs. Much of the Mendenhall Flats, one of the major estuarine areas in the CBJ, is within an ADF&G Game Refuge. All salt marsh and intertidal flats within this area not currently protected within the refuge should be subject to development standards. In addition, careful consideration of development in neighboring and ecologically-connected areas such as the Mendenhall Valley, Auke Bay, and Gastineau Channel is important to prevent secondary impacts to the ecological functioning of the Mendenhall Flats. Activities in and near other major estuarine areas such as Echo Cove and the Eagle River Delta should also be carefully controlled to insure against alteration of important resources.

Coastal beaches, shorelines and riparian habitat areas are of particular importance to wildlife; they are edge areas for different habitat types which simultaneously provide critical components of wildlife habitat. Shoreline areas are particularly important to waterfowl, furbearers, and bald eagles. The importance of the shorelines of Auke Lake, Mendenhall Lake, Mendenhall River, from Eagle River to Echo Cove and on the west shore of Douglas Island have been noted previously. Development in intertidal or inundated portions of shorelines and in adjacent upland areas should be carefully considered to avoid conflicts between

human activity and resource values. Buffers of restricted development to minimize direct and indirect impact of shoreline zones should be observed.

Old-growth (mature) forest is a critical habitat for species such as the spotted owl. Recent studies have demonstrated the importance of this habitat type to sustaining Sitka black-tailed deer populations in moderate to heavy winters. The retention of old-growth forest for game and non-game wildlife should be considered in areas where wildlife values are particularly high, such as in deer wintering and bald eagle nesting habitat. Important areas within the CBJ include Lemon Creek, the Douglas Island coastal belt, and shoreline forests with high density eagle nests. Logging in association with timber harvest, and urban development with attendant human activities and domestic animals would reduce the habitat values of old-growth forest.

Data Requirements

Much of the information for wildlife in the CBJ is general and exists only for a few species. Areas critical to the maintenance and survival of many species are not known. Until such data is gathered, planning for development in concert with wildlife values will depend on site-specific studies or general development policies.

The need to understand the role of muskeg in the hydrology of stream and rivers is underscored by the potential effect of muskeg development on minimum stream flows and fisheries resources. General information on hydrologic relationships between muskeg and ground and surface water availability, and specific information on watersheds of particular concern should be generated.

Research is needed to determine the extent of old-growth forest habitat required to maintain species that are dependent on this disappearing resource. Management requires better information on aspects of habitat quality for key species, including minimum patch size, optimum percentage of old growth versus second growth, and total extent of habitat required.

Section VII

Economics and Populations

VII. ECONOMICS AND POPULATION

INTRODUCTION

This section describes economic and population characteristics of the CBJ and projects growth for the 15-year period through 1997. These factors are essential components of the Comprehensive Plan due to the relationship of land use, public facilities and services, and transportation to the type and level of economic activity. Economic conditions determine employment levels, which in turn are the leading influence in population growth. The data included in this section is from the 1980 U.S. Census data and several pertinent studies in 1982.

EXISTING CONDITIONS

ECONOMY

The economy and population of the CBJ originally developed around mining activities in the area. With the move of the territorial capital to Juneau in 1906, and particularly since Alaska became a state in 1959, Juneau has more than doubled its population, mostly due to state government expansion. This expansion has occurred largely as a result of the development of Alaska's oil resources and the State's increased land holdings and related management responsibilities. Table VII-l shows the growth in employment and population in Juneau during the 1970's and also reflects the linkage of growth in private sector employment to levels of government employment.

Table VII-2 indicates the components of the area's employment in 1980, distinguishing between basic and support employment.

"Basic" jobs are those generated and paid for by outside income (e.g., central state government positions and tourist-related jobs). "Support" jobs are generated by the exchange of dollars within the community (e.g., CBJ employees and grocery clerks.

The figures indicate that for every 100 1980 basic sector jobs in Juneau, 93 support jobs have been created. The primary contributors to Juneau basic employment are central (having statewide functions) and regional (those that serve the population of southeast Alaska). Other important components are state government, central and regional federal government, tourism, the fishing industry, and Alaskan Native corporations. The major components of support sector employment are retail and wholesale trade, government to serve the local population, services and transportation, and public utilities. The dominating effect of government is evidenced by the fact that nearly 60% of all civilian employment is provided by state, local, and federal agencies

Table VII-1

JUNEAU ECONOMIC AND POPULATION TRENDS, 1970-1980

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Alaska's 0-1980;	Resident Population of Alaska's tical Quarterlies, 1970-1980;	Total	Estimates of U.S. Census;	Alaska Department of Labor Est Census Divisions; the 1980 U.S	Alaska Departme Census Division	Sources:
% % %	4.0%	0.1%	6.0%	5.1%	6. 8	Annual Rate of Change
4,792	6,012	1,212	3,851	10,804	19,528	1980
4,463	2,966	1,155	3,847	10,429	N/A	1979
4,366	6,017	1,244	3,760	10,383	19,500	1978
4,079	5,722	1,093	3,622	9,801	18,886	1977
4,055	5,559	1,084	3,470	9,614	18,760	1976
3,914	5,234	991	3,274	9,148	17,714	1975
3,671	4,728	942	2,936	8,399	17,195	1974
3,488	4,494	996	2,691	7,982	16,593	1973
3,261	4,440	914	2,534	7,701	15,079	1972
2,796	4,401	1,253	2,237	7,196	14,564	1971
2,486	4,011	1,198	2,163	6,497	13,556	1970
All Private Sector Employment	All Govt Government Employment	Federal Govt Civilian Employment	State Government Employment	Total Civilian Employment	Population	Year

Table VII-2

ESTIMATED JUNEAU AREA EMPLOYMENT BY INDUSTRY, 1980

BASIC SECTOR	Annual Average Employment, 1980
State Government ¹	
Central	2,850
Regional	843
Total State Government	3,693
Federal Government	
Central	671
Regional	573
Total federal government	1,244
Other Basic Employment	•
Mining	10
Fish Processing	30
Fish Harvesting	185
Basic Construction	100
Statewide (Lobbyists) Offices	50
Tourism/Basic Travel	430
ANCSA Corporations	100
Total Basic Employment	5,842
SUPPORT SECTOR	
State Government, Local	158
Federal Government, Local	254
Local Government	949
Construction, Support	258
Manufacturing, Support	54
Transportation, Communication & Public Utili	
Wholesale Trade	139
Retail Trade	1,230
Finance, Insurance & Real Estate	314
Service	1,209
Total Secondary Employment	5,446
TOTAL EMPLOYED LABOR FORCE	11,288
BASIC/SUPPORT RATIO	1.00/0.93
LABOR FORCE PARTICIPATION	57.8%
TOTAL POPULATION	19,528
Total average annual state government employed for 1980 disaggregated on the basis of 1980 in State and Federal Government Employment Homan-McDowell. Includes uniformed personnel of the U.S. Collaboration average annual federal government employed.	o study findings in Juneau, bast Guard. Total loyment (1,212+286
uniformed personnel), disaggregated on same Sources: Alaska Department of Labor Statist	tical Quarterlies
and Estimates of Employed Labor Fo	orce, 1st, 2nd
and 3rd quarters; Homan-McDowell,	4th quarter
estimates, 1980; Cogan/Shapiro	•

estimates, 1980; Cogan/Shapiro

(Table VII-1). Homan-McDowell estimates that government accounts for 84% of Juneau's basic employment.

As shown in Table VII-3, in 1980, the government payroll of more than \$155 million accounted for approximately two-thirds of the area's total payroll of \$240 million. The total private payroll in 1980 was approximately \$85 million. For the 1970-1980 period, the average annual payroll growth rate was 13.2%, with private and government payrolls expanding at similar rates. Homan-McDowell estimate that the total government payroll in 1982 will be approximately \$200 million and that the combined public and private payroll for the year will be in excess of \$300 million. In 1980, the average government salary was \$26,709 and is estimated to be more than \$30,000 in 1982. The average private salary, including part-time and seasonal labor, was approximately \$17,700 in 1980 and is estimated to be more than \$20,000 in 1982.

Several factors contribute to the area's lack of economic diversity and dependence on government. First, the CBJ has attained its present size because of the growth in government employment. Were it not for the capital, the population of Juneau would certainly be much lower. Another consideration is the isolation and difficulties of transportation to and from the area. Juneau is not accessible by road and is approximately 100 miles from the open ocean. Economic activities which require efficient transportation and access have not tended to locate in the area. Another factor is the high cost of labor, high labor force participation rates, and low unemployment in the Juneau area. factors of high labor force participation and low unemployment combine to keep the available supply of labor low. The availability and cost of labor is a major consideration for many industries. A final consideration is the availability of natural resources that can be developed economically. Natural resources played a much greater role in the area's economy in the past, when minerals could be economically extracted, when the commercial fishing industry found more harvestable stock, and before major changes in fishing technology.

On the other hand, two activities which add to the diversity of the area's economy are tourism and the operations of the ANSCA corporations (formed under the terms of the Alaska Native Claims Settlement Act). Employment in tourist-related businesses has expanded over the past several years to 430 jobs in 1980 (the most recent year for which figures are available). Tourism is a major generator of sales for many businesses in the Juneau area, particularly downtown and in the Historic District. The most active months of the tourist season, June through September, occur when visitors related to the legislative session, approximately January to May, have left. The Native corporations, Sealaska and Goldbelt, which are involved primarily in resourcebased economic activities and real estate development, have added to the basic economic sector by increasing their employees to approximately 100 in 1980.

Table VII-3

TRENDS IN JUNEAU'S TOTAL PAYROLL, 1970-1980

			Payroll (\$000)
Year	Population	Total	Government	Private
1970	13,556	\$69,665	\$45,606	\$24,059
1971	14,478	. 81,132	52,712	28,420
1972	14,979	93,369	55,198	38,171
1973	16,593	99,249	58,442	40,807
1974	17,195	114,099	69,263	44,836
1975	17,714	137,035	87,614	49,421
1976	18,760	163,106	102,909	60,197
1977	19,174	175,612	114,401	61,211
1978	19,500	197,631	129,150	68,481
1979	N/A	211,228	139,231	72,07
1980	19,528	240,325	155,627	85,058
Annual Rate of				
Change	3.9%	13.2%	13.%	13.5%

Sources: Alaska Department of Labor, Statistical Quarterlies, 1970-1980; Homan-McDowell

Note: An official population estimate was not made for 1979 due to the 1980 census.

Much of Southeast Alaska and the entire state face the similar issues of diversification of local economies. Communities are strongly dependent on natural resources, the market for these resources, transportation, and the economic feasibility of resource development. Tourism and recreation-related employment has been growing statewide and contributes to local economies in varying degrees.

Commercial (retail and services) activity in the CBJ is primarily to support the economy because it is dependent on basic sector activity and the exchange of dollars within the community. Homan-McDowell estimates that 80% of all private employment is in the support sector. A notable characteristic of the retail and service component of the Juneau economy is the relatively low level of retail sales activity, as shown by the comparison of family income spent on retail items in several Alaskan cities, the State of Alaska, and the United States (Table VII-4). As can be seen, Juneau residents spent only 44% of their effective buying income on retail goods and services in the area, while those in other locations spent 62-71% of their buying income locally on these items. Assuming that CBJ residents spent a portion of their disposable income on these goods similar to the Alaskan average of 67%, the average family spent approximately \$12,000 per year in the CBJ and \$6,000 elsewhere. This amounts to a sales leakage of more than \$46 million in 1982.

There are several major reasons for this leakage. First, is the lack of adequate variety and inventory of goods in area stores. Another is the high price of goods relative to what can be purchased through mail order or directly in Seattle and elsewhere. Finally, Juneau's residents probably travel to a greater extent than most Alaska residents and do much of their shopping while on vacation or business trips.

The dual problem of leakage and lack of sufficient variety is at least partially attributable to the low level of investment in retail facilities in the CBJ in recent years which in turn is due to the uncertainty regarding the continued presence of the capital. This has particularly affected retail businesses in the downtown area. The state leases rather than owns much of its office space; thus, willingness to pay high rents competes with and has reduced many retail businesses in the area. This decrease in the number and variety of retail business has in turn diminished the strength and competitiveness of the entire downtown retail area. Other factors, including insufficient parking and new shopping facilities in the Mendenhall Valley and airport areas, have also contributed to the decline of downtown business activity.

Industrial space, including warehousing and distribution activities, is concentrated in the waterfront area south of downtown and in the area around the airport. These facilities handle goods primarily for the local population. With the increase in mining activity and development of other natural resources, more extensive facilities may be needed. Another potential contribution to demand

Table VII-4

1980 HOUSEHOLD EXPENDITURES ON RETAIL ITEMS IN JUNEAU AND OTHER ALASKAN CITIES

Item	Juneau	Ketchikan	Fairbanks	Anchorage	Alaska	U.S.
Median household effective buying income (EBI)	\$27,266	\$26,068	\$34,358	\$25,816	\$24,999	\$19,146
Food	13\$	178	148	17.58	178	148
Eat and drink	7.8	13%	12%	10%	8.5%	5.5%
General merchandise	18	3&	58	118	& &	89 89
Furniture, etc.	1%	38	28	28	2%	38
Automotive	3.5%	48	78	% %	89	118
Drug	2%	38	3%	48	æ 8	28
Total retail sales per household	448	628	899	718	678	618

Sales and Marketing Management, 1981 Survey of Buying Power, Mundy, Jarvis and Associates; Cogan/Shapiro Sources:

for port facilities is the development of warehousing facilities to serve a regional market. Such facilities would probably require a location better situated to service by ships and barges than the present location which requires a relatively lengthy trip up the Gastineau Channel. Transportation to and from the docking and warehousing facilities on the south waterfront adds to traffic problems in the downtown area. Land for expansion of these facilities is also limited. The problems of adequate space for facilities and travel distances required for shipping have restricted and continue to restrict economic activities dependent on shipping and water access.

The market and economic feasibility of such facility development has not been analyzed in detail. There are strong indications that a market for such facilities exists. Suitable locations appear to exist on north and northwest Douglas Island.

POPULATION

The population of the CBJ grew by 44% between 1970 and 1980, for a total of 19,528 (Table VII-5). The most recent official population estimates by the State of Alaska, Department of Community and Regional Affairs, for July 1982 indicated that 21,080 people resided in the CBJ. The annual population growth rate of approximately 4% was lower than the rate of employment growth of approximately 5%, due to the increased labor force participation rate.

During the 1970's, there was a dramatic change in the age composition of the population. While the overall number increased by 44%, those under the age of 18 increased by only 3.8%. At the same time, the 18 to 64 age group expanded by 56.4% and persons over 65 increased by 40.7%. In terms of actual numbers, the 18 to 64 group experienced by far the largest growth, accounting for approximately 90% of the CBJ population change during the decade. This reflects a relative increase in the number of single adults, couples without children, and families whose children have grown and left home.

The representation of different races in the Juneau population did not change dramatically (Table VII-5). Although all racial groups increased, only Japanese and Chinese residents grew at a rate substantially higher from the population as a whole. Because of the relatively small number of Japanese and Chinese people, these changes have little general significance.

Table VII-5 also indicates that the total number of households increased faster than the population. This reflects a trend that has been occurring throughout the U.S. of more couples without children, single persons living alone, and greater numbers of older persons living without children or alone. A very important characteristic of households in the CBJ is the significant increase (110.5%) in owner-occupied housing and relatively small increase (22.7%) in rental housing. Owner-occupied housing grew from 46.7% to 63.2% of all households between 1970 and 1980.

Table VII-5

POPULATION CHARACTERISTICS, 1970-1980

Characteristic	1970	1980	% Change
Total Population	13,556	19,528	44.0
Sex Male Female	N/A N/A	10,022 9,506	N/A N/A
Age Under 18 18 to 64 65 and over	5,223	5,424	3.8
	7,620	11,916	56.4
	506	712	40.7
Race* Caucasian Black American Indian, Eskimo, Aleut Japanese, Chinese Filipino Other	11,428	16,459	44.0
	108	142	31.5
	1,545	2,190	41.7
	27	70	159.3
	285	374	31.2
	203	293	44.3
Total Households	4,223	7,035	55.7
Rental	2,112	2,591	22.7
Owner-occupied	2,111	4,444	110.5

*Estimated

Sources: U.S. Census of Population and Housing, 1970 and 1980; Cogan/Shapiro

Future Economic Development

Further expansion of the area's economy will continue to depend primarily upon future levels of central and regional state government employment. Employment in another basic industry, tourism, can also be expected to continue growing. On the other hand, analysts foresee that federal employment will remain near current levels and that patterns in fishing capacity and technology will cause fishing industry employment to remain static or decline somewhat.

Much attention has been given in recent years to the potential for diversifying Juneau's economy to lessen dependence on government employment and expand other basic sector employment. This, in turn, would result in additional support sector commerce and employment and thereby add to the area's economic vitality. With the notable exception of tourist related employment, there has been very limited diversification in recent years. In the future, it is likely that mining activity and employment will increase significantly, with the opening of the Noranda mine, a major mining facility on Admiralty Island projected to employ more than 300 workers, and the development of other mineral deposits in the area. Tourist-related employment is likely to continue its expansion, particularly if the capital remains in Juneau. Additional employment in the fishing industry is improbable. An increase in jobs in the wood products industry is possible, but cannot be projected at this time.

While growth in other basic industries or the emergence of new sources is possible, but unlikely. The factors previously described as inhibiting diversification in the past will continue to influence economic development of the area. With the exception of the minerals industry noted above, there are no present indications of major shifts in resource markets that would affect the economy of the area.

The revenues of the retail and service portion of the support economy have been, as previously noted, unusually low. The most probable major factor contributing to this has been the uncertainty surrounding the possible capital move. Because commercial buildings are not covered by the indemnification legislation as private homes are, the risks of investing in commercial buildings are relatively high. If a firm decision is made to retain the capital in Juneau, it is likely that there will be substantial investment in commercial property and businesses. this investment would be to capture a greater percentage of current and future retail expenditures and reduce the high rate of sales leakage. In the fall of 1982, the CBJ will receive a market analysis of potential commercial uses on the Gold Creek development site. This study is expected to provide data that is not presently available concerning the amount of existing commercial space and future demand for such space.

Table VII-6 presents projections of employment growth for government, other basic industries, and the support sector, for the 15-

year period through 1997. State government employment increases of 2.7% per year projected in recent studies by the State are used as a basis for these projections. Tourist-related employment is estimated to grow at 5% annually. The Noranda mine is assumed to begin operation in 1987 with a full employment contingent of 300. Mining industry employment is assumed to grow at 5% annually after that date. The 5% rate of growth in tourism and mining could be conservative; however, there are no specific foreseeable developments or events that warrant higher projections at this time. No increase in other basic employment is assumed. After 1982, a basic/non-basic ratio of 1.00/1.00 is used. This ratio anticipates a modest strengthening of the support sector due to increased investment in retail facilities.

TABLE VII-6
EMPLOYMENT PROJECTIONS 1982-1997

	State	Other	Total	Total	Total
	Government	Basic	Basic	Support	Employment
1982	3,926	2,306*	6,232*	5,795*	12,028*
1987	4,566	2,712	7,278	7,278	14,556
1992	5,225	2,930	8,155	8,155	16,310
1997	5,950	3,068	9,018	9,018	18,036
Net Gain 1982-1997	2,024	762	2,786	3,223	6,008

*estimated

Sources: Cost Assumptions of Retaining Juneau as the Capital City ("No Move" study), Cogan/Shapiro

These projected increases in various types of employment are not easily translated into land requirements and comprehensive plan land use designations. At the most general level, a ratio of existing land use for commercial and indusrial uses to total population could be developed and used, in combination with population projections, as the basis for estimating future area requirements. This method can provide only a general estimate because of factors such as varying space requirements for different industrial uses, varying space requirements and sales per square foot expectations for different types of retail uses, and insufficient information concerning the current efficiency of space use. Such an approach can, however, be useful in combination with knowledge of existing development and educated judgment, to estimate land requirements for commercial and industrial areas.

Population Projections

Population growth in Juneau, as elsewhere, is directly related to employment opportunities. The anticipated economic trends and employment levels discussed previously form the basis for population projections presented below.

The assumptions used in making these projections are as follows:

- 1. There will be 1.7 workers per household; this is a continuation of the current high labor force participation rate in the CBJ relative to Alaska and other U.S. cities.
- 2. An unemployment rate of 7.4% is used for the entire 15year period. This was the average unemployment rate for 1979-1980, the most recent period for which data is available.
- 3. To determine total population, it is assumed that the average of 2.74 persons per household identified in the 1980 U.S. census will remain the same through 1997. There are no evident demographic trends that indicate there will be significant changes in average household size in the CBJ.
- 4. Employment levels will be as projected in Table VII-6.

As indicated in Table VII-7, an increase of approximately 3,800 households and 10,500 persons can be anticipated between 1982 and 1997.

TABLE VII-7
HOUSEHOLD AND POPULATION PROJECTIONS, 1982-1997

	Total Households	Total Population ²
1982 ¹	7,641	20,900*
1987	9,247	25,300
1992	10,361	28,400
1997	11,457	31,400
Net increase	,	
1982-1997	3,816	10,500

Estimated on the basis of employment projections presented in Table VII-5.

Numbers are rounded.

Source: Cogan/Shapiro

Summary of Findings

- 1. Government employment is the dominant force in Juneau's economy, accounting for 65% of all jobs and 85% of the local economy.
- Other prominent basic sector activities include tourism, resource-related industries, and Native corporations.
- 3. Due to the extreme dependence of the Juneau area economy on government, and the relatively small size of other basic activities, the economy can be characterized as lacking in diversity. Substantial diversification is unlikely due to the combined effect of isolation, transportation and labor costs, and foreseeable market conditions relagting to resource development.
- 4. The retail and service sectors of the local economy are operating at levels lower than should be expected for such a community. Retail sales "leakage" (purchases made outside Juneau) for 1982 is estimated to be \$46 million. If a firm decision is made to retain the capital in Juneau, substantial investment in commercial facilities can be anticipated. This should lead to a greater selection of retail goods, a reduction of sales leakage and an increase in support sector employment.
- 5. Industrial area and commercial docking facilities in the south waterfront have limited capability for expansion. These facilities may also limit the growth of related economic activities in the Juneau area.
- 6. Population growth in Juneau is largely dependent on economic expansion and specifically on growth in state government employment. Approximately 6,000 persons were added to the population of Juneau during the 1970's; for the 15 year period between 1982 and 1997, the population is expected to grow by 10,500.

Section VIII

Land Use

VIII. LAND USE

INTRODUCTION

The following sections describe each subarea within the planning study area in terms of the type and intensity of existing development; current and anticipated future ownership; and predominant land use issues. Where appropriate the subareas have been divided further into discrete neighborhoods. General findings follow:

- Development in Juneau is predominantly linear, adhering to its topographic characteristics of narrow coastal benches bordered by steep mountains. Private land ownership patterns are confined to those benches and the two major glacial valleys.
- Private land ownership has been limited. Currently, of all land within the study area, 19,037 acres or 9.8% are in private ownership compared to 175,015 acres or 90.2% under the jurisdiction of federal, state, or municipal governments.
- Over the last 30 years, development has taken place primarily on flat land in the East Mendenhall Valley and Lemon Creek. Availability of municipal sewer and water are other important considerations.
- Approximately 95% of land within the focus area is undeveloped. Existing land use for the remaining developed land is shown in Table VIII-l on the following page.

A summary of land uses by type for each subarea is included in each of the following subarea subsections.

Table VIII-1
EXISTING LAND USE (FOCUS AREA)

Туре	Acres		Percent*	
Residential		2,521		64.5%
- Single Family	2,241		57.4%	
- Multi-Family	96		2.5%	
- Mixed Single/Multi Family	74		1.9%	
- Mobile Home	110		2.8%	
Commercial/Industrial		598		15.3%
- Commercial	221		5.7%	
- Mixed Residential/Commercial	43		1.1%	
- Industrial	192		4.9%	
- Gravel Pits	142		3.6%	
Other		788		20.2%
- Public	329		8.4%	
- Parks	294		7.5%	
- Schools	94		2.4%	
- Quasi-Public	71		1.0%	
TOTAL		3,907		100.0%

^{*} Percent of developed land.

SUBAREAS AND NEIGHBORHOODS

AUKE BAY/WEST MENDENHALL VALLEY/MENDENHALL PENINSULA SUBAREA

AUKE BAY NEIGHBORHOOD AREA

Existing Land Use

This area extends from Auke Creek to just east of the ferry terminal, and includes the western half of Auke Lake. Land uses are dense and mixed, including single family and duplex residential, multi-family residential, marine related and general commercial, and a variety of public uses. Municipal services include sewer but not water.

The dominant uses along the bay are the CBJ Auke Bay Harbor, DeHart's Marina and Store, and Fisherman's Bend Marina. Major public uses include the Auke Bay Elementary School, National Marine and Fisheries Service Laboratory facility, a Coast Guard facility, and the University of Alaska, Juneau campus on the western shore of Auke Lake. The lake also is a popular site for canoeing, kyacking, and fishing.

Most of the private land is developed. The CBJ holds title to a major tract north of Auke Lake, and other public ownerships dominate its west side.

Significant development proposals which will affect Auke Bay include:

- Floating breakwater which will provide transient moorage for approximately 260 boats and some related upland facilities, planned by the Alaska Department of Transportation and Public Facilities (DOT/PF);
- Additional tideland and upland facilities in support of the breakwater, (CBJ);
- Seafood processing facility on leased tidelands;
- Student housing facilities and additional academic housing, (University of Alaska, Juneau).

- Need to plan and mitigate impacts of development of tidelands and upland facilities for Auke Bay harbor expansion;
- Need for land for expanded University of Alaska, Juneau facilities;

- Potential pressure for development of additional retail uses and services;
- Inadequacy of public services such as water and transportation.

WEST MENDENHALL VALLEY NEIGHBORHOOD AREA

Existing Land Use

This area is bounded by Glacier Highway and the Mendenhall River and includes the eastern half of Auke Lake and a portion of the Montana Creek drainage area. It consists of the relatively flat west valley and a hill of moderate slope and height bordering Auke Lake.

Existing land use is almost exclusively low density single family and duplex residential. As no major roads serve the interior of the west valley, most development is adjacent to Glacier Highway and the Back Loop Road. There are some subdivisions at the intersection of the Back Loop and Montana Creek Roads. Brotherhood Park, a CBJ facility, is the only major public use within the area. Other than the above, the west valley is essentially undeveloped.

Public ownerships predominates, with CBJ and state land selections accounting for most of the land between Auke Lake and the Mendenhall River. The CBJ has selected large tracts north of the Back Loop Road into the Montana Creek drainage. The area is not served by municipal water or sewer.

The Mendenhall Valley Transportation Plan Map adopted by the CBJ calls for the area to be served by collectors on the west bank of the Montana Creek and midway between Montana Creek and the Mendenhall River. The proposed Montana Creek collector corridor also would contain the beginnings of a drainage system to alleviate the problems caused by a very high water table and poor natural drainage.

- Disposal and development of state and CBJ selected lands;
- Designation of road corridors;
- Preservation of a greenbelt along the west bank of the Mendenhall River and Montana Creek;
- Extension of municipal services including drainage.

MENDENHALL PENINSULA NEIGHBORHOOD AREA

Existing Land Use

This neighborhood extends from Auke Creek to the Mendenhall River. It is bounded on the north by Glacier Highway and includes the peninsula and the flatlands which comprise the western portion of the Mendenhall River delta. The area is not served by municipal water or sewer.

Land use consists primarily of single family residential along the eastern and western edges of the peninsula and scattered industrial uses on the flatlands. A Federal Aviation Administration (FAA) facility is located at the midpoint of the peninsula. Various low intensity industrial and commercial uses are located on the flatlands.

The CBJ has selected two large tracts of land which, combined, comprise the major portion of the peninsula. The flatlands are in private ownership and mostly undeveloped. Some of the area is located in the Mendenhall Wetlands Game Refuge.

Two development proposals may impact this planning area. The North Douglas Development Plan proposes a second Gastineau Channel crossing to link the peninsula with North Douglas; and the CBJ is studying the feasibility of rock quarrying activities on the northern portion of the peninsula. This would provide rock for construction activities and remove a land form which poses some difficulty for planes using the Juneau International Airport.

Land Use Issues

- Construction of the channel crossing;
- Potential conflict between residential development on the peninsula and the use of the airport;
- Quarrying activities on the peninsula;
- Additional industrial and commercial development may conflict with the wetlands resource on the west side of the Mendenhall River.

POINT LOUISA-INDIAN POINT NEIGHBORHOOD AREA

Existing Land Use

This neighborhood extends from east of the Auke Bay Ferry Terminal to the vicinity of the intersection of Lena Cove Road and Glacier Highway.

Existing land use (Table VIII-2) consists primarily of single family residential along Glacier Highway and the coast. A major use is the Auke Village Recreation Area in the Tongass National Forest which includes a campground and picnic area. Other than the Ferry Terminal there is no commercial or industrial development and nearly all private land has been developed.

Public land ownership dominates. Two major tracts of land are patented to the CBJ as part of its municipal selection, and a smaller tract at the tip of Auke Cape (Indian Point) is also in CBJ ownership. The National Park Service owns the remainder of Auke Cape.

The area is not served by municipal sewer or water.

Land Use Issues

- Management of CBJ selected lands;
- Lack of public access to CBJ land at Indian Point.

Table VIII-2

EXISTING LAND USE

AUKE BAY, WEST MENDENHALL VALLEY, MENDENHALL PENINSULA

	Acres	Percent of Developed Land
Single Family	531	59.2%
Multi-Family	1	0.1
Commercial	20	2.2
Industrial	63	7.0
Parks	63	7.0
Public	139	15.5
Schools	49	5.5
Quasi-Public	7	0.8
Gravel Pits	24	2.7
TOTAL	897	<u>+</u> 100%

DOUGLAS/WEST JUNEAU SUBAREA

WEST JUNEAU NEIGHBORHOOD AREA

Existing Land Use

This neighborhood extends from the Douglas Bridge south to Lawson Creek. It is bounded on the west by the National Forest boundary and the edges of CBJ selected lands.

Existing land uses (Table VIII-3) are nearly exclusively residential, including single family and duplex, two large multi-family developments, and other smaller multi-family uses. There is one small retail use and no industry or parks. A significant amount of the privately owned land is vacant, but there has been considerable recent interest in development of additional multi-family units. The CBJ has selected a tract of land that straddles Lawson Creek.

Land Use Issues

- Disposal and development of CBJ selected lands;
- Infill of existing subdivided lots and subdivision of vacant tracts;
- Additional multi-family housing.

DOUGLAS NEIGHBORHOOD AREA SUBAREA

Existing Land Use

This neighborhood area extends from Lawson Creek south and includes the former city of Douglas.

Existing land uses (Table VIII-3) are predominantly residential with a mixure of single family, duplex, and multi-family development. The downtown area contains some smaller commercial uses, public facilities such as the Douglas Fire Hall and the Douglas library, and a large state office building.

Public facilities include a public small boat harbor, Savikko Park, Mt. Jumbo Gym, and Gastineau Elementary School.

Land ownership is primarily private except for CBJ holdings, including municipal selections, above the city to the west and south. A close-in tract of CBJ owned land is for sale for residential development. More distant municipal selections are extensive.

Douglas is served by municipal sewer and water and a range of other services.

There has been considerable interest in additional residential development, including multi-family.

Land Use Issues

- Disposal and development of CBJ selected lands;
- Retention/expansion of commercial uses downtown;
- Continued residential infill;
- Maintenance of adequate public facilities and services;
- Future use of the Treadwell Mine site.

Table VIII-3

EXISTING LAND USE

DOUGLAS/WEST JUNEAU SUBAREA

	Acres	Percent of Developed Land
Single Family	95	47.3%
Multi-Family	23	11.1
Mixed Single/Multi-Family	14	7.0
Commercial	4	2.0
Mixed Residential/Commercial	20	10.0
Industrial	-	-
Parks	15	7.5
Public	21	10.1
Schools	9	4.5
Quasi-Public	-	_
Gravel Pits	-	_
Mobile Home		_
TOTAL	201	<u>+</u> 100%

EAST MENDENHALL/AIRPORT SUBAREA

EAST MENDENHALL VALLEY NEIGHBORHOOD AREA

Existing Land Use

This neighborhood area is bounded by the Mendenhall River, Egan Expressway, Thunder Mountain, and Mendenhall Lake. The area is flat and drained by Duck and Jordan Creeks, and the Mendenhall River.

The east valley is the major residential area of the CBJ. Land use (Table VIII-4) is predominantly single family and duplex residential, including several mobile home parks. The former generally is within subdivisions, but there is a relatively small but increasing amount of multi-family housing being developed. Public uses include Glacier Valley Elementary School, Floyd Dryden Junior High School, Adair-Kennedy Memorial Park, Melvin Park, and Mendenhaven Minipark. Though there are a few scattered commercial uses, all retail activity is confined to the Mendenhall Mall area. Industrial uses are limited to one site north of the mall adjacent to the river.

The major roads are the Egan Expressway, Mendenhall Loop Road, and Riverside Drive. The area is served by municipal sewer but not water.

Various studies have focused on the east valley. The amended Mendenhall Valley Transportation Plan map adopted by the CBJ calls for expanding and upgrading Riverside Drive to collector status, widening the Mendenhall Loop Road, and constructing a Jordan Creek collector. A draft Mendenhall Valley Drainage Study examines various drainage options for the area, and also includes the west valley. The Mendenhall Valley Urban Forestry Study recommends an open space plan, with emphasis on streamside greenbelts.

- Future development and infill of the east valley is limited by the level of existing services, including sewers, roads and streets, and drainage. Lack of a municipal water system is another inhibiting factor.
- Adoption and implementation of the Mendenhall Valley Transportation Plan will allow increased development.
- Land is required for additional public facilities, including schools, a community park, neighborhood parks, and a public library.

- Disposal and development of CBJ selected lands.
- Increased development is likely to subject the east valley to severe air quality problems, especially from automobile exhaust and smoke from woodburning stoves and fireplaces. The valley's climate is characterized by atmospheric inversions which cause poor dispersion of air pollutants.

AIRPORT NEIGHBORHOOD AREA

Existing Land Use

This neighborhood is bounded by the Egan Expressway on the north and the Mendenhall River and Yandukin Drive on the east. It is a small and relatively densely developed area, containing a variety of land uses (Table VIII-4). The area contains the Nugget Mall and several large adjacent retail and office uses. An extensive residential neighborhood with single and multi-family housing is adjacent to the river. The area is dominated by Juneau International Airport and related adjacent uses; other public facilities are the Bus Barn, Centennial Park and the Mendenhall Sewage Treatment Plant.

With the exception of public facilities, the land is privately owned. There are no municipal land selections. The area is served by municipal sewer; a water system serves the airport and nearby uses. Major roads are Old Glacier Highway, Mendenhall Loop Road, Yandukin Drive, and Old Dairy Road.

The Mendenhall Valley Transportation Plan recommends improving the connection between Yandukin Drive and Old Glacier Highway.

- Expansion of Juneau International Airport.
- Development of adjacent airport-related uses.

Table VIII-4

EXISTING LAND USE

EAST MENDENHALL VALLEY/AIRPORT

		Percent of
	Acres	Developed Land
Single Family	690	58.1%
Multi-Family	40	3.4
Commercial	94	7.9
Industrial	26	21.9
Parks	131	11.0
Public	33	2.8
Schools	20	1.7
Quasi-Public	46	3.9
Gravel Pits	51	4.3
Mobile Home	61	5.1
Mixed Single/Multi-Family		_
Mixed Residential/Commercial		_
TOTAL	1,188	<u>+</u> 100%

ECHO COVE/EAGLE RIVER SUBAREA

ECHO COVE/EAGLE RIVER NEIGHBORHOOD AREA

Existing Land Use

This neighborhood extends from Herbert River to Echo Cove. With the exception of municipal and Goldbelt land selections, it is within the Tongass National Forest; other than recreational cabins, the area is undeveloped. Echo Cove and Herbert and Eagle Rivers are popular recreation areas. The Forest Service is planning significant timber sales in the Cowee-Davies Management Area. Plans include construction of timber access roads along Cowee and Davies Creeks which would cross both Goldbelt and CBJ lands; construction of a log transfer facility one mile north of Sawmill Creek (north of the planning area); and an access road from the log transfer facility to the terminus of Glacier Highway at Echo Cove.

Goldbelt has initiated planning efforts for its land at Echo Cove. Potential land uses include low and medium density residential and commercial/industrial development.

Land Use Issues

- Disposal and development of CBJ selected lands.
- Development of Goldbelt selected lands at Echo Cove.
- Maintenance of public access to Echo Cove.
- Mitigation of impacts of timber harvest activities of the Forest Service in the Cowee-Davies management area.

AMALGA HARBOR NEIGHBORHOOD AREA

Existing Land Use

This neighborhood extends from Aaron Drive, just north of Tee Harbor, to Herbert River. It is a narrow coastal area bounded on the east by the Tongass National Forest and traversed north to south by the Glacier Highway.

Its characteristic land use is low density single family residential on relatively large lots, including some mobile homes. Residences are clustered along Pearl Harbor, Huffman Harbor, Amalga Harbor, and Glacier Highway north of Amalga Harbor Road. Additional private land holdings, mostly vacant, are located between Pearl Harbor and Herbert River. Other land uses include the Shrine of St. Teresa and related church uses; the Amalga Harbor boat ramp; a gravel pit inland of Pearl Harbor, and the scout camp at the mouth of Herbert River.

National forest lands -- Windfall Lake, Peterson Creek, Herbert River Trail -- to the east are popular recreation points, and offshore areas are used for fishing.

Development has been limited by public ownership of much of the land. However, significant tracts of former federal holdings are being conveyed to the CBJ as part of its municipal entitlements. The area is not served by municipal sewer or water.

- Municipal land selections can increase the amount of developable land.
- Existing municipal services are limited to fire protection and road maintenance.

JUNEAU SUBAREA

Existing Land Use

The Juneau subarea includes the former City of Juneau, excluding West Juneau.

Existing land uses (VIII-5) are complex and most easily summarized by neighborhoods or subareas, each characterized by a dominant use.

The Highlands and the neighborhood bounded by Glacier Avenue, 9th, 12th, and A Streets are basically occupied with single family and duplex housing. Star Hill and the neighborhood surrounding Dixon, Calhoun, and 5th also are residential neighborhoods with a mixture of single and multi-family units. They all are relatively mature and stable.

Downtown consists of a retail district bounded by the Egan Expressway, Ferry Way, South Franklin and 2nd, and an office area dominated by the state Capitol and the court building.

Mixed land uses for multi-family housing, retail, and offices, characterize more recently developed areas such as the Harborview Urban Renewal section and the land between Willoughby and the Egan Expressway.

The waterfront north of the Douglas Bridge contains industrial uses and the two small boat harbors. South of the bridge, public and industrial uses dominate.

Public facilities include several schools, parks, and the cemetery. Land ownership is mostly private, except the waterfront and tidelands.

The Juneau planning area has been the subject of the Downtown Plan, Downtown Transportation Plan, and the Waterfront Plan, none of which have been adopted officially. A Historic District Development Plan is being reviewed at the present time.

Nearly the entire planning area is developed and opportunities for new development are limited. Areas that have been identified for potential development/redevelopment are the central waterfront, including the tidelands of the Gold Creek delta; Willoughby Street area; and portions of South Franklin.

- Encroachment of office uses on the downtown retail district.
- Historic preservation/renovation of the downtown area.

- Planning for expansion of state office facilities.
- Location of a new parking structure.
- Redevelopment of the waterfront, including the Gold Creek development project.
- Preservation of existing residential neighborhoods.
- Retention/development of high density multi-family housing.
- Maintaining the commercial viability of downtown.
- Residential development in high landslide/avalanche hazard areas.

Table VIII-5 EXISTING LAND USE

JUNEAU

		Percent of
	Acres	Developed Land
Single Family	65	18.3%
Multi-Family	9	2.5
Mobile Home	1	• 3
Mixed Single/Multi-Family	60	16.9
Commercial	46	12.9
Mixed Residential/Commercial	23	6.5
Industrial	20	5.6
Parks	29	8.1
Public	87	24.4
Schools	16	4.5
Quasi-Public	-	-
Gravel Pits		
TOTAL	356	<u>+</u> 100%

LENA COVE/TEE HARBOR SUBAREA

Existing Land Use

This area extends from Aaron Drive, north Tee Harbor to the vicinity of the intersection of Lena Cove Road and Glacier Highway.

Its characteristic land use (Table VIII-6) is low density single family residential, commonly on waterfront lots. Other uses include a marina at Tee Harbor, an Alascom facility, a Forest Service recreation area, and an undeveloped CBJ park. Ownerships include private and state and municipal selected lands. The area is not served by municipal sewer or water.

Land Use Issues

- Development of additional launch ramps for small boats at Lena Cove or Tee Harbor.
- Management of municipal and state land selections.
- Maintenance of existing residential densities.

Table VIII-6

EXISTING LAND USE

LENA COVE/TEE HARBOR

		Percent of
	Acres	Developed Land
Single Family	407	86.2%
Multi-Family	-	_
Commercial	20	4.2
Industrial	_	_
Parks	31	1.5
Public	31	56.6
Schools	_	_
Quasi-Public	_	_
Gravel Pits	7	1.5
Mobile Home	_	_
Mixed Single/Multi-Family	-	-
Mixed Residential/Commercial		
TOTAL	496	<u>+</u> 100%

LEMON CREEK/SWITZER CREEK SUBAREA

Existing Land Use

This area is bounded by Yandukin Road and the Egan Expressway on the west, Vanderbilt Hill Road area on the east, and the Tongass National Forest on the north. It includes the drainage of Lemon Creek, Switzer Creek, and Sunny Point. The area is generally flat, with rising terrain at the edges of the Lemon Creek Valley.

With the exception of CBJ and Goldbelt land selections, most of the area is fairly densely developed for a variety of uses. (Table VIII-7). Between Glacier Highway and the Egan Expressway, heavy industrial (sand and gravel extraction, concrete and asphalt production, and solid waste disposal) uses predominate. It also is the site of a mobile home park, commercial marine service facility, and retail uses.

On the northern and eastern side of Glacier Highway, residential uses which include multi-family, single family, and three mobile home parks, predominate. Public uses include the state prison and the central offices of the state Department of Transportation and Public Facilities. There are no developed parks. There have been conflicts between industrial and residential land uses. Some of these are addressed in a sand and gravel extraction ordinance being considered by the CBJ. Environmental problems, especially water quality, have resulted from the industrial and landfill activities.

Major roads in the area are the Egan Expressway and Glacier Highway. The area is served by municipal sewer but not water. When Glacier Highway is widened, water mains would be installed as part of the project.

The CBJ has selected large tracts of land on either side of the Lemon Creek Valley, extending well into the upper valley. The latter lands are adjacent to the creek and likely to contain extractable sand, gravel, and rock resources. The state, Goldbelt and private interests also own land in the upper valley.

In the Switzer Creek area, a site of approximately 40 acres has been rezoned for commercial use, probably a retail shopping center.

Land Use Issues

- Conflicts between industrial and residential uses.
- Planning and regulation of sand, gravel, and other resource extraction.
- Disposal and/or development of CBJ and Goldbelt selected lands.
- Extension of municipal water.
- Future commercial development.

Table VIII-7

EXISTING LAND USE

LEMON CREEK/SWITZER

	Acres	Percent of Developed Land
Single Family	223	41.0%
Multi-Family	19	3.5
Mobile Home	45	8.3
Commercial	33	6.1
Industrial	79	14.5
Parks	26	4.8
Public	41	7.5
Schools	-	_
Quasi-Public	18	3.3
Gravel Pits	60	11.0
Mixed Single/Multi-Family	~	_
Mixed Residential/Commercial		
TOTAL	544	+ 100%

NORTH DOUGLAS SUBAREA

Existing Land Use

This area extends from the Douglas Bridge, around the periphery of Douglas Island, to the limit of CBJ land selections west of Fish Creek. It also includes the Fish Creek corridor and Eaglecrest ski area.

Existing land use (Table VIII-8) is nearly exclusively low density single family residential, including some mobile homes. Others include some multi-family residential, a heliport, and scattered industrial and commercial. Public uses include the Eaglecrest ski area, Fish Creek Park, and the North Douglas boat ramp. North Douglas is primarily undeveloped.

Private land ownership is limited to a relatively narrow belt of land adjacent to the road, and the CBJ has selected large tracts of land inland. Under federal ownership are steep interior portions of the planning area and the periphery of the island which is relatively flat. It may be developable in private hands.

Development proposals for North Douglas include a preliminary study by the Army Corps of Engineers of a small boat harbor site, and the North Douglas Development Plan of the Chamber of Commerce. The latter includes a causeway from the Mendenhall Peninsula, an industrial park, and a commercial harbor facility.

In addition to skiing in and around Eaglecrest, the beach areas of North Douglas are used extensively for recreation. Offshore waters are popular for fishing.

- Disposal and development of CBJ selected lands.
- Evaluation of the North Douglas development plan, including the second channel crossing, a commercial/industrial harbor facility, and an industrial park.
- Evaluation of transportation alternatives including a bench road inland from the existing highway and extension of the highway around the entire island.
- Reservation of beach areas for public use.

Table VIII-8

EXISTING LAND USE

NORTH DOUGLAS

		Percent or
	Acres	Developed Land
Single Family	230	93.9%
Multi-Family	4	1.6
Mixed Single/Multi-Family	-	-
Mobile Home	3	1.2
Commercial	4	1.6
Mixed Residential/Commercial	-	-
Industrial	4	1.6
Parks	-	_
Public	-	_
Schools	-	_
Quasi-Public	-	_
Gravel Pits		_
		
TOTAL	245	<u>+</u> 100%

THANE SUBAREA

Existing Land Uses

This area extends from the former southern city limits of Juneau to the end of Thane Road. It is bounded on the northeast by federal lands and mining claims.

With the exception of a fish hatchery and the Thane Substation, land use is low density, single family and duplex residential. Much of the private land is undeveloped.

The CBJ has selected a tract on Sheep Creek which is intended for gravel extraction. Gravel mining on state-owned lands on Sheep Creek Delta also is being considered.

The area is reached by Thane Road. It is not served by municipal sewer or water.

- Preservation of existing residential character.
- Management of gravel extraction.

WEST DOUGLAS SUBAREA

Existing Land Use

This subarea extends from the limits of CBJ land selections east of Outer Point to south of Point Hilda. With the exception of a single residence, it is undeveloped. Major ownerships are limited to Goldbelt and the CBJ. The area is served by North Douglas highway only as far as False Outer Point. No municipal services are provided.

It is characterized by moderate slopes, forested vegetation with some muskeg, and exceptionally high habitat values for Sitka deer and bald eagles.

- Potential development of Goldbelt selected lands.
- Management of CBJ selected lands.
- Maintenance of stream corridor and easements for beach access.

LAND REQUIREMENTS METHODOLOGY

This section summarizes the methodology employed to project the amount of land needed by the CBJ between 1982 and 1997.

Residential

The following steps were teken to determine residential land requirements. A summary on Table VIII-9 follows.

- 1. The projected population and household increase by 1997, plus a vacancy factor of 4%, was the basis for calculating the total additional housing units.
- 2. These needed units were allocated proportionately to urban, new growth, and rural residential development according to policies previously formulated. The latter was assigned 10% of the total housing while the remaining 90%, or 3,800 units, were allocated to urban and new growth area development.
- 3. The 3,600 units for urban and new growth area development were then allocated to three major density categories:
 - Low density--averaging 4 units per acre
 - Medium density--averaging 10 units per acre
 - High density--averaging 30 units per acre

Sixty percent of the anticipated needed urban units was allocated to low density; 30% to medium density; and 10% to high density. This follows the current distribution of various housing types in the CBJ documented in the findings in Volume I.

- 4. Basic acreage requirements were calculated based, on average density and the allocation of units to the low, medium, and high density categories. Total need includes an overallocation factor of 150%.
- 5. The units and acres assigned to low and medium density urban/suburban development were then divided--20% to new growth areas and 80% to urban/suburban areas. Acreage allocations are summarized in Table VIII-9.
- 6. The 425 units allocated to rural development were assumed to require an average density of three acres per unit, or a total of approximately 1275 acres. No over-allocation factor was included as it is anticipated there is substantial land zoned rural conservation that can accommodate additional residential development if needed.

Commercial Land

Two methods were used to estimate commercial land requirements.

The initial approach was to base projected acres for retail, commercial, and services upon anticipated employment levels. The projected 3,223 employee increase in the service sector was reduced by 25% to 2,417 to allow for government related employment. This number, representing commercial/retail service employees some of whom are employed in industrial activities, was multiplied by 300 square feet of building space per employee. The resulting figure was divided by a factor of .25 to allow for a site coverage ratio of 25%. The result is 2,900,700 square feet, or approximately 67 acres for projected commercial uses.

This system was validated by calculating the ratio of current commercial land use to residential land use, a factor of 11.2% which is based on 273 acres of commercial land and 2,430 acres of residential land in use now. The 11.2% factor was then applied to a projected residential increase of 698 acres, yielding an estimated 78 acres needed for commercial land purposes. This estimate is consistent with the employment-based methodology which projected 67 acres. For purposes of this report, the projected commercial land requirement is approximately 72 acres.

To allow for additional space for government offices, 5 acres was added, to a total requirement of 77 acres. For planning purposes, an over-allocation factor of 50% or 39 acres was employed resulting in a total of approximately 116 acres needed for commercial use. This is the basis for allocations in the land use plan map.

Industrial Land

As discussed in the preceding sections of this report, there is little reason to expect major new industrial development in the CBJ, due to the area's physical isolation, high labor cost, and low labor availability. However, industrial growth may take place with expansion and improvements to marine transportation facilities and possible increased mining activities which may require land to store supplies and equipment. More land also will be needed for warehousing and distribution activities which follow population growth and retail commercial facilities. Water-dependent industrial activities also could expand if additional services, repair, and supply facilities for the fishing and recreational boating industries are provided.

For planning purposes, it is the consultant's judgment that the CBJ should have available sufficient industrial land to allow for a possible doubling of industrial activity between 1982 and 1997. Currently, 192 acres are used for industrial purposes. As many as 190 more acres could be required by 1997 if a new marine transportation facility with backup land is established on north Douglas Island, and other waterfront industrial and related commercial activities expand significantly.

As a guideline for preparation of the land use plan map, it is assumed that 190 acres of vacant industrial land will be needed by the next 15 years.

Table VIII-9

Allocation of Projected Residential Growth and Land Requirements

To Community Form*

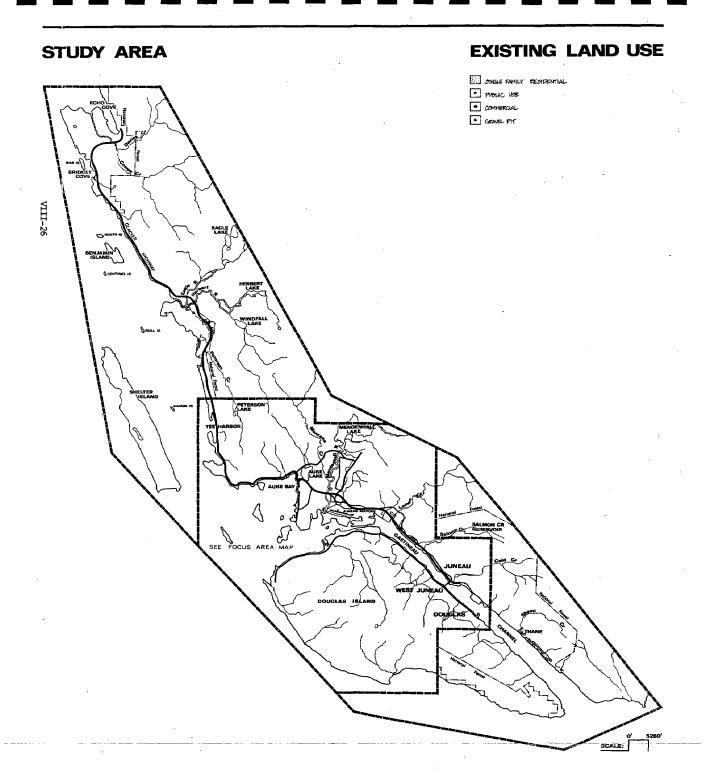
Acres

E E	Required Housing Units**	Q	ensity & Un	Density & Unit Breakdown		Basic	Total***
TOIAL	6621#	Category	Density	Unit Allocation	tion	Requirement Requirement	Requirement
Allocation:		Low	4 u/ac	60%	2,286	571	1,428
90%-Urban Areas & New Growth Areas	3,810	Medium	10 u/ac	308	1,143	114	285
				10%	381	13	32
		High	30 u/ac	subtotals 3,810	3,810	698 ac.	1,745
10%-Rural Areas	425	Rural Residen- tial	1 u/3 ac	1	425	1,275 ac.	1,275 ac.
				TOTAL	4,235	1,973 ac.	3,020 ac.

plan land use These are assumptions which were used to guide preparation of the and community form map. Note:

** Total required to serve projected growth.

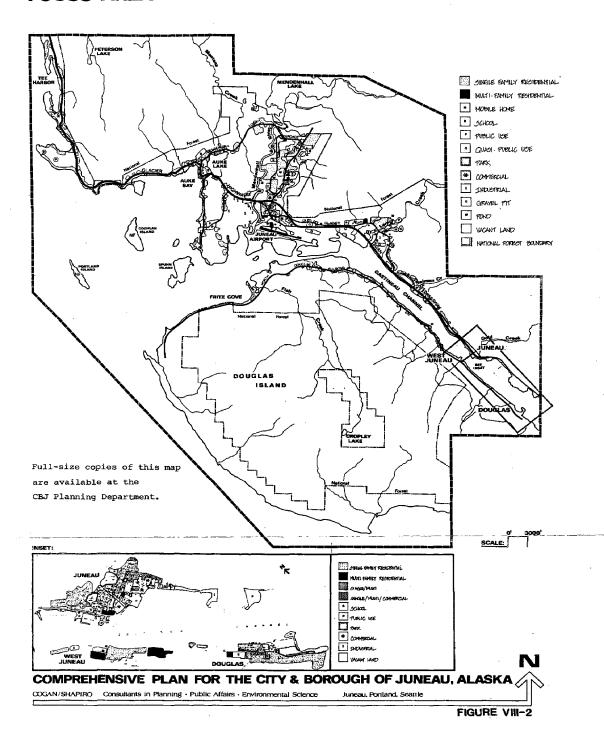
*** Total land requirements are comprised of basic residential land requirements plus an overallocation factor of 150% to assure market choice for urban/new growth areas land.



Full-size copies of this map are available at the CBJ Planning Department.

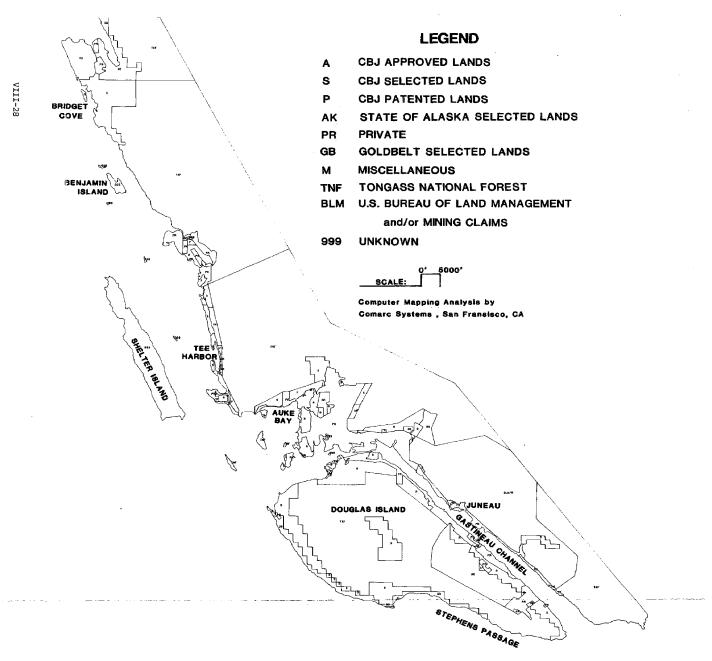
FOCUS AREA

EXISTING LAND USE



STUDY AREA

LAND OWNERSHIP



Full-size copies of this map are available at the CBJ Planning Department.

Section IX

Housing

IX. HOUSING

INTRODUCTION

This section summarizes information about housing supply, condition, and needs for the City and Borough of Juneau. It is based upon an analysis of available information sources, including housing reports prepared by City and Borough staff; previous consulting studies; a recent dwelling unit count; and relevant reports of federal and state agencies. A list of sources is attached. Housing demand has been extrapolated from population and household projections prepared by Cogan/Shapiro. The 15 year time selected for all housing projections is the period from 1982 to 1997.

EXISTING CONDITIONS

HOUSING SUPPLY

For at least a decade, the City and Borough of Juneau has experienced a critical shortage of housing. In a survey of citizens completed recently by Cogan/Shapiro, the goal, "provide affordable housing" ranked third among goals for the CBJ. More than 95% of respondents indicated that there is a need for the construction of new housing for both renter and owner occupancy.

It is perceived widely in the CBJ that vacancy rates for both sales and rentals are less than 1%, resulting in an especially severe shortage of rental units.* However, the 1980 Census indicates higher vacancy rates: 2.2% for owner-occupied and 5.5% for rentals. In recent years, although there has been a sharp increase in the supply of owner-occupied housing, both single family homes and condominiums, demand has kept pace with this growth. However, due to reduced construction, substantial demolition, and conversions to condominiums and commercial uses, the supply of rental housing has grown very slowly while demand continues to increase.

According to the U.S. Census Bureau, Juneau's 1980 population was 19,528, an increase of 44% from 13,556 in 1970. During the same period, the number of housing units increased by 70% from 4,224 to 7,656. By 1982, nearly 8,100 units were available. Similiar to other urban areas in Alaska and elsewhere, Juneau experienced a decrease in average household size, from 3.21 to 2.74. Thus, more units are required to shelter a given amount of population now than in 1970.

^{*} Sources include references 1, 2, 5, and 6, as well as a 1972 CBJ housing study.

While the number of units for owner occupancy more than doubled during the decade, the supply of rental housing increased by only 22%, resulting in a significant decline in the proportion of rental units in the Borough's housing stock (Table IX-1).

Table IX-1
HOUSING TENURE IN JUNEAU

Year	Occupied _Units	Owner Occupied	Renter Occupied	<pre>% Renter Occupied</pre>
1960	3051	1365	1686	55%
1970	4224	2106	2118	50%
1980	7035	4444	2591	37%

Source: U.S. Bureau of Census

This dramatic change in the proportion of renters highlights a serious problem: rental housing is in great demand and difficult to find in Juneau. It also is very costly. Most housing units constructed since 1970 are single family residences (Table IX-2) and many of the multi-family units which have been built are condominiums.

Table IX-2

NEW HOUSING UNITS AUTHORIZED BY BUILDING PERMITS IN JUNEAU

(1970-81)

Year	Single Family	Multi- Family	Mobile Homes	Total Units
1970	51	106	NA	157
1971	82	139	NA	221
197 2	114	291	36	441
1973	102	143	29	274
1974	66	36	20	122
1975	114	30	10	154
1976	179	99	. 3	281
1977	305	120	4	429
197 8	285	46	20	351
1979	273	35	48	356
1980	173	91	44	308
1981	264	196	31	491
	2008	1332	245	3585

NA: Not Available

Source: U.S. Department of Housing and Urban Development

The sharp decrease in new construction in 1974 may be attributed to the vote favoring a move of the state capital. However, in 1975, single family housing starts rebounded, supported by mortgage subsidies from the Alaska Housing Finance Corporation and the provisions of the Indemnification Act, which guarantees state compensation to homeowners in the event of loss of market value resulting from a capital move. Multi-family rental construction activity has been sporadic, due largely to a lack of available investment capital. Not only are many recently constructed multi-family units condominiums, but an estimated 169 existing rental units were converted to condominiums between 1978 and 1980. Current conversions are approximately 10 units per month.

Many low income households cannot find appropriate shelter and live in substandard or shared units. The effective vacancy rate may, in fact, be considered negative because fewer rental units are available than the total number of renter households. 1

As shown in Table IX-3, more than three quarters of the borough's housing units are located in the Juneau and Glacier Valley service areas. In the past five years, the housing stock has increased dramatically in the Valley, Auke Bay, and Lynn Canal areas.*

The housing stock is generally in good condition, much of it new. A 1977 inventory reported that less than 5% of the dwelling units were marginal or substandard, and most of these were located in Service Area 1.2 Since 1977, many of these have been demolished or converted to nonresidential uses.

^{*} The distribution of housing units by service area in 1977 is shown in reference 2, page 3.

Table IX-3
HOUSING UNITS BY SERVICE AREA - 1982

	Area	Housing Units in 1982	Percent
6.	Juneau ^a Douglas Rural Auke Bay Glacier Valley ^b North Douglas Salmon Creek Lynn Canal	2,189 535 86 654 3,985 290 126 222	27 7 1 8 49 4 2
0.	Total	8,087°	100

a Former city limits of Juneau.

Source: CBJ assessor's data.

HOUSING COST

The price of owner and renter-occupied housing units has increased sharply in recent years. For 1982, Housing Director Annand estimates average rents as follows:

E	fficiency	\$450
1	Bedroom	550
2	Bedroom	600
3	Bedroom	650

This is approximately 20% higher than estimates from a survey of landlords and tenants conducted by the borough in 1980. While Juneau residents enjoy the highest median income in Alaska, 60% of renters have household incomes below the borough median. According to a report by the research agency of the Alaska House of Representatives, the average rent for a two bedroom unit is 25% of the median income for a family of three, and for a three bedroom unit, 23% of the median income for a family of four. Because most renter households earn less than the median income, housing costs require a greater share of their incomes. I

b Includes Mendenhall Valley, Lemon Creek, and Airport areas.

This is not comparable with the total in Table IX-1, which includes only occupied units. Nonoccupied units include vacant units available for sale or rent and those which are unavailable due to seasonal, migratory, or other uses. The total number of units identified in the 1980 Census was 7,656.

The estimated average cost for new single family homes is between \$90,000 and \$110,000.5,6 The 1980 Census reported that the median value of a single family home was \$84,300, compared with \$30,000 in 1970. Total monthly payments on a \$90,000 home loan through the Alaska Housing Finance Corporation require more than half of the gross median income for a family of four.5

HOUSING PROGRAMS

Both the state and the CBJ administer programs to address housing problems in Juneau. These include:

Owner-Occupied Housing

 Home Mortgage Loans - Alaska Housing Finance Corporation (AHFC), sells bonds and offers, through private lenders, mortgage financing to Alaska residents at below market rates.

Rental Housing

- Rehabilitation Loans Juneau Community Development Block Grant Program makes available low interest loans to rehabilitate multi-family housing. Homeowners no longer are eligible for loans.
- Interest Free Loans The CBJ offers developers funds at a rate of \$15 per square foot. These loans lower the effective mortgage rate by approximately one fourth. No payments are due for the first five years, during which rents on all units are regulated. During years 6 through 13, payments are made on an accelerating schedule; 20% of the units must be reserved for low income tenants at below market rents.
- Public Housing and Rental Subsidies At the present time, 350 rental units are subsidized in some manner by public funds. Using 1980 Census figures as a base, this represents 14% of all rentals and 5% of all dwellings. Of these, 202 are owned and managed by the Alaska State Housing Authority; 137 were constructed by private developers with the assistance of HUD Section 236 mortgage subsidies; and ll are occupied by households holding Section 8 certificates. Marine View Apartments, one of the five public housing projects, was built with state funds, and a 20 unit addition to the Mountain View project for the elderly is now under construction, also using state funds. According to a 1981 HUD report, 50 new units have been authorized under the new construction provision of Section 8. Funding has not yet been allocated.

A number of additional programs which can stimulate new housing are under study. There is a strong likelihood that AHFC loans will be made available for developers of rental housing. It has also been suggested that the CBJ make land available at subsidized rates to private developers as an incentive to reserve some units for low income households.

A recent effort to develop a cooperative housing project using \$90,000 in CDBG funds was unsuccessful and the monies have been reallocated. According to a report prepared for the state legislature, there are four options for improving rental housing opportunities in Alaska:

- Build additional public housing;
- Create a new state program similar to federal Section 8
 New Construction;
- Organize a new state rental assistance program similar to federal Section 8 for Existing Housing;
- Develop a renter rebate program.

PROJECTED NEEDS

The supply of housing must be increased to provide more affordable units and accommodate future growth. A vacancy rate of at least 4% is characteristic of a healthy housing market. This provides some choice to prospective renters and purchasers and encourages landlords and sellers to maintain competitive conditions and prices. The current vacancy rate for sales and rentals in Juneau is estimated to be less than 1%, although the 1980 Census projects less critical shortages.

Demolition and conversion of residential buildings for commercial, industrial, and governmental uses continue to erode the housing market. During the 1970s the impact was especially severe in the downtown area because of state and borough office expansion. The rate of housing loss from these factors has slowed considerably, and some converted units may be returned to residential uses if adequate office facilities elsewhere are available in the future.

On the other hand, a reduction in rental housing due to condominium conversion appears to be accelerating. With the cost of single family homes rising dramatically, condominiums have become an important form of housing in Juneau. Borough staff estimated in 1980 that there were 351 condominium units in Juneau, primarily downtown and the Mendenhall Valley. Most downtown units were newly constructed, while those in the valley had been converted from rentals.⁵

Since then, both new construction and conversion have continued. While the former adds to the number of units available, the effect of these changes is to make more housing available for higher income purchasers, but reduce options for renters, many of whom have low or moderate incomes.

A CBJ ordinance requires that current renters be offered first option to purchase units undergoing conversion, and be given 90 days to move if they do not choose to buy. While these are important protections for current renters, they do not address the impact of condominium conversion on the overall rental housing market. Accepting an estimate of ten units per month, an annual rate close to 5% of the rental housing stock is removed from the market.

A proposed new housing code also may affect rental stock. As most of Juneau's residential units are relatively new, revised code requirements can be expected to affect only the 3% to 5% of units in the worst condition.* However, these units are occupied primarily by people with low incomes and limited housing choices.

Using population projections and a housing inventory prepared by Cogan/Shapiro, 3 estimates of overall housing needs for the next 15 years are shown in Table IX-4.

Table IX-4
PROJECTED HOUSING NEEDS THROUGH 1997

Year	Total Population	Total <u>Households</u>	Total Available Units Required**	Units to be Constructed
1982	20,936	7,641	7,699 (exist	ing) -
1987	25,337	9,247	9,632	1,933
1992	28,389	10,361	10,793	1,161
1997	31,392	11,457	11,934	1,141

The following assumptions were made:

- Proportions of renter and owner occupied units and housing units unavailable for occupancy in the 1980 Census are applicable in 1982.

^{*} John Annand, personal communication.

 Vacancy rate of 4% for both owner and renter housing in 1987, 1992, and 1997.

To attain the 11,934 units required by 1997, a total of 4,235 units must be constructed, 1,933 in the next five years.* This will relieve the present housing shortage as well as provide for future growth. This is a projection of net requirements; further demolition, condemnation, and conversion to non-residential use is likely to increase the number of units needed. Conversely, any use of non-residential space for housing would reduce the requirement. If the capital remains in Juneau and new office space for state agencies is created, several buildings in the downtown area could be reconverted to acceptable housing.

The first step in determining what kinds of units are needed is to analyze the mix of owner and renter occupied housing. As noted previously, the proportion of renter households declined dramatically between 1970 and 1980, which may in part be caused by the shortage of such housing. If more rental housing were available, more households might choose this alternative.

Three possible options are described in Table IX-5. Scenario A assumes that the proportion of rental households reported in the census (36.8%) remains constant. Scenario B assumes that the number of rental households would increase by 5% of its current level (to 38.0%) if housing were available. Scenario C is based on the assumption of even more rental households (43.5% -- halfway between the 1970 and 1980 proportions), but still a smaller proportion than estimates of the City and Borough and HUD in recent years.

^{*} This estimate calls for a rate of production considerably smaller than HUD projections, prepared before 1980 Census results were available. 6 In that report, 1983 population was estimated at 23,550 (8,471 households); the proportion of renters was assumed to be 45%.

Table IX-5
PROJECTED HOUSING CONSTRUCTION NEEDS

Number of Additional Units

	Scena	rio A	Scena	rio B	Scena	rio C
Period_	Owner	Renter	Owner	Renter	Owner	Renter
1982-1987	1,283	650	1,170	763	640	1,293
1987-1992	734	427	720	441	656	505
1992-1997	721	420	707	434	645	496

The greatest differences are in the first period, which also is the time when most construction is required. Based on available information, Scenario B appears most realistic, though the 5% overcrowding factor upon which it is based may be high. It is reasonable to conclude that to create a healthy housing market, approximately 500 rental units and 800 sale units must be constructed by 1987.

SUMMARY OF FINDINGS

- Between 1970 and 1980, Juneau's population increased 44% while its housing stock grow by 70% to nearly 7,700 units. By 1982, nearly 8,100 units were available. The average number of people per unit declined during this period, so that generally, housing construction has only just kept pace with demand.
- The number of owner-occupied units -- family homes, duplexes, and condominiums -- has more than doubled since 1970. In 1980, 63% of Juneau's units were owner-occupied, increased from 50% ten years before. At the same time, housing costs have risen significantly; currently, the median price of a single family home in Juneau is approximately \$100,000.
- The supply of rental housing increased by little more than 20% in the past decade. Relatively few new rental units have been built while an increasing number of existing units have been converted to condominiums and commercial office uses. By 1980, rental units comprised 37% of CBJ's housing stock, as compared to 50% in 1970.

- If the capital is moved, the State of Alaska will compensate homeowners, but not owners of rental housing, for the lost market value of their homes. This factor, coupled with state-subsidized low-interest residential mortgages, favors the construction of owner-occupied housing, and may in large part account for the significant shift in ownership patterns observed in CBJ over the past decade.
- The shortage of rental housing particularly affects low income families, many of whom share or live in substandard units.
- Approximately half of all residential units have been constructed since 1970; CBJ housing stock generally is in good condition. Most marginal and substandard units, estimated to be less than 5% of the total, are located in downtown Juneau.
- Approximately 3,500 additional housing units, or about 235 units annually, will be required to accommodate Juneau's population growth between 1982 and 1997. Additional new units will be needed to replace those which are demolished or converted to nonresidential uses.
- To maintain existing ownership patterns, rental units should comprise at least one-third of all new housing starts; this is a significant increase over construction levels during the 1970s. The CBJ can facilitate this construction by zoning adequate vacant land for medium and high density residential development.
- Several current and proposed government programs encourage new residential construction. These include mortgage subsidies available through the Alaska Housing Finance Corporation and CBJ, and public housing and rental subsidies from the Alaska State Housing Authority and federal Department of Housing and Urban Development (HUD).

Section X

Public Facilities and Services

X. PUBLIC FACILITIES AND SERVICES

INTRODUCTION

Public facilities such as schools, police and fire stations, parks, and libraries; and public services such as sewer and water help define the quality of life of a community.

In Juneau, municipal facilities and services are provided either area-wide or in service areas. Municipal facilities provided on an area-wide basis include parks and recreation, libraries, and schools; service-area facilities include police and fire protection. Sewer and water systems are considered area-wide, although the systems do not serve the entire CBJ.

The local share of financing water and sewer improvements is through a combination of fees and special assessments such as local improvement districts (LID). Municipal water and/or sewer services are available only in certain areas of the CBJ and, therefore, those areas do not directly correspond to the Service Areas shown in Figures X-l and X-2. An overriding issue resulting from this complex in funding system is the difficulty of implementing comunity-wide development policies.

Following is a summary of major facilities and services in Juneau.

EXISTING CONDITIONS

WATER

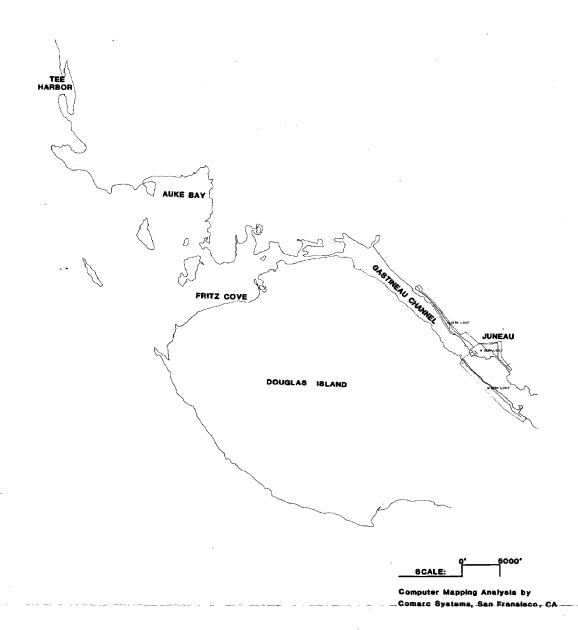
Type and Location

Municipal water systems currently serve Juneau City and Douglas City. Four small systems serving East Mendenhall Valley subdivisions and the airport also are operated by the CBJ. All other areas are served by individual or small community water systems which utilize wells, surface water, or catchment basins.

The current status of municipal water systems is summarized in Table X-1.

FOCUS AREA

WATER LINES AND SERVICE AREAS



Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

COGAN/SHAPIRO

Consultants in Planning • Public Affairs • Environmental Science

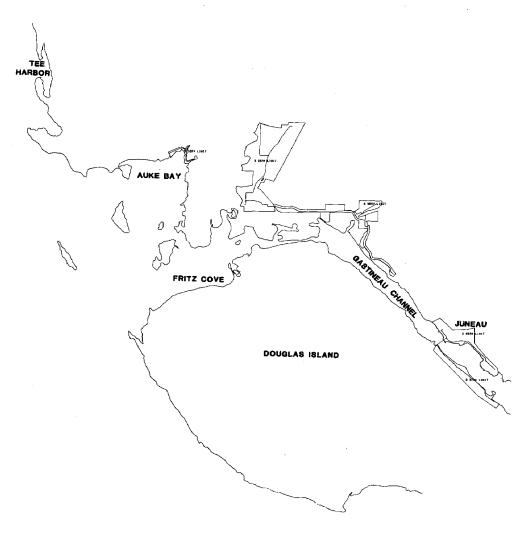
Juneau, Portland, Seattle



FOCUS AREA

SEWER LINES AND SERVICE AREAS

×



SCALE:

Computer Mapping Analysis by Comarc Systems, San Francisco, CA

Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN - CITY & BOROUGH OF JUNEAU, ALASKA

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Juneau, Portland, Seattle

TABLE X-1 MUNICIPAL WATER SYSTEMS

	Dem	andl	Supply ²
System	Average	Peak	(10)3 gallon/day
Juneau	1,770	2,700	7,920
Douglas	140	470	455

1 Quadra Engineering, "Water & Sewer Rate Engineering Study." CBJ, Engineering Department.

The Juneau system is supplied by reservoirs fed by wells and springs located in Last Chance Basin, immediately east of downtown Juneau. The supply of water greatly exceeds current levels of use, and the quality is very high. The Douglas system is supplied by an 800,000-gallon reservoir fed by surface water. It also can be supplied by a connection with the Juneau water system. The supply and quality of water in Douglas is generally adequate; however, during periods of low flow, the community depends on the Juneau system. Occasionally, water pressure for fire suppression is inadequate.

The areas served by the above systems are shown in Figure X-1, Sewer and Water Service Areas.

The CBJ anticipates extending the Juneau water main as far north as Switzer Creek. Local distribution systems are not included in the project, which is to be completed during fiscal year 1982-83.

Residents report occasional severe problems with water quantity in Lemon Creek, the East Mendenhall Valley, Auke Bay, North Douglas, and the Mendenhall Peninsula.

The CBJ has applied for additional water rights from Salmon and Nugget Creeks, whose potential supply is 6,000,000 gallons/day. Additional sources are test wells under Thunder Mountain in the East Valley and Montana Creek. These, combined with existing sources, would likely result in an abundant supply of high quality water for current and projected future needs. The ability to build an adequate distribution system, rather than supply, is the limiting factor.

Summary of Findings

 A shortage of on-site water limits higher density development in many areas of the CBJ not presently served by municipal water. Areas such as Auke Bay, North Douglas, and the East Mendenhall Valley experience seasonal shortages.

- . Generally, area-wide water supplies area adequate, but distribution systems are lacking. CBJ voters recently rejected a bond measure for water systems. Studies of alternative rate structures for sewer and water charges are underway. This may allow greater flexibility in local funding.
- . The East Mendenhall Valley is in immediate need of a water system to serve the existing population.
- . Growth in areas dependent upon on-site water supply is resulting in seasonal water shortages and water quality degradation. Such areas include North Douglas and the Mendenhall Peninsula.

SANTTARY SEWER

Type and Location

The three muncipal sewer systems in the CBJ are in Juneau-Douglas; Mendenhall Valley-Lemon Creek; and Auke Bay. Their capacities and use are summarized in Table X-2.

TABLE X-2

SEWER SYSTEMS (Millions of Gallons/Day)

	Capac	ity	Dema	ind
System	Average	Peak	Average	Peak
Juneau-Douglas	2.7	7.2	2.3	5.1
Mendenhall Valley	1.48	3.7	1.3	1.85
Auke Bay	.1	_	0.05	0.07

¹Quadra Engineering, "Water & Sewer Rate Engineering Study."

The Juneau-Douglas system serves Juneau City, West Juneau and Douglas City; the Mendenhall Valley-Lemon Creek system serves the area between Bartlett Memorial Hospital (Salmon Creek) and the Mendenhall River; and the Auke Bay system serves the immediate vicinity of Auke Bay and the University campus (Figure X-1, Sewer and Water Service Areas).

All other development in the CBJ is served by on-site sewage disposal systems, primarily septic tanks.

Summary of Findings

. In Juneau City, the sewage collection system is combined with storm drainage. During periods of high rainfall, the

treatment plant is occasionally overloaded. This problem is being addressed by an ongoing program of installing separate storm sewers. Generally, the capacity of the plant greatly exceeds current use levels. With storm sewer separation, even more capacity will result.

- . The Mendenhall Valley-Lemon Creek system is at or over capacity. The major cause of the overload is sewage generation; expansion of the plant will be required in the near future. The problem of infiltration of groundwater is being studied by the CBJ.
- . The Auke Bay system is well within its design capacity. Plans call for connecting the system to an expanded Mendenhall Valley system if and when plant capacity is reached.
- . A problem common to all three systems is that a new site must be acquired for sludge disposal. Disposal at the Mendenhall Peninsula site was causing contamination of groundwater and has been stopped.
- . The amount of land outside sewer service areas suitable for on-site systems is limited. Refer to the Geology section for a more detailed discussion.
- . With the exception of Juneau City, the City and Borough lacks central storm sewer systems. Development in the East Mendenhall Valley has resulted in serious drainage problems due to no overall drainage system.
- . The East Mendenhall Valley sewer system is inadequate to serve the existing population. Even after solving the infiltration problem, expansion of the plant will be necessary.
- Inadequate sewer capacity is a serious constraint to development in all areas outside the Juneau-Douglas system.
- Existing on-site systems may be causing health problems in areas depending upon surface water or shallow wells for individual water supply.
- . The lack of a central storm drainage system causes problems in the East Mendenhall Valley. Drainage problems will probably be encountered in the West Mendenhall Valley if current development continues.

SOLID WASTE

Type and Location

Solid waste disposal is not provided by the CBJ. A private firm collects and disposes of waste for the entire are, utilizing the landfill site at Lemon Creek (Figure X-2, Public Facilities and Services).

Summary of Findings

- . The landfill consists of approximately 21 acres, having recently been expanded from 15. This should be adequate for five to eight years. It is not likely that an additional expansion will be approved by the Alaska Department of Environmental Conservation (ADEC).
- . The landfill operation causes serious deterioration in water quality to on-site ponds and minor problems in Lemon Creek. ADEC has no ongoing monitoring program, but does require maintenance of minimal water quality standards in the on-site ponds.
- . Disposal of sewage sludge is a special solid waste problem in the CBJ. The existing site west of the Mendenhall River is no longer approved for sludge disposal. Two sites on Thane Road are being filled.
- . New sites and/or new methods for solid waste and sludge disposal must be developed to serve future needs.
- . Water quality problems at the Lemon Creek site should be studied and mitigated.

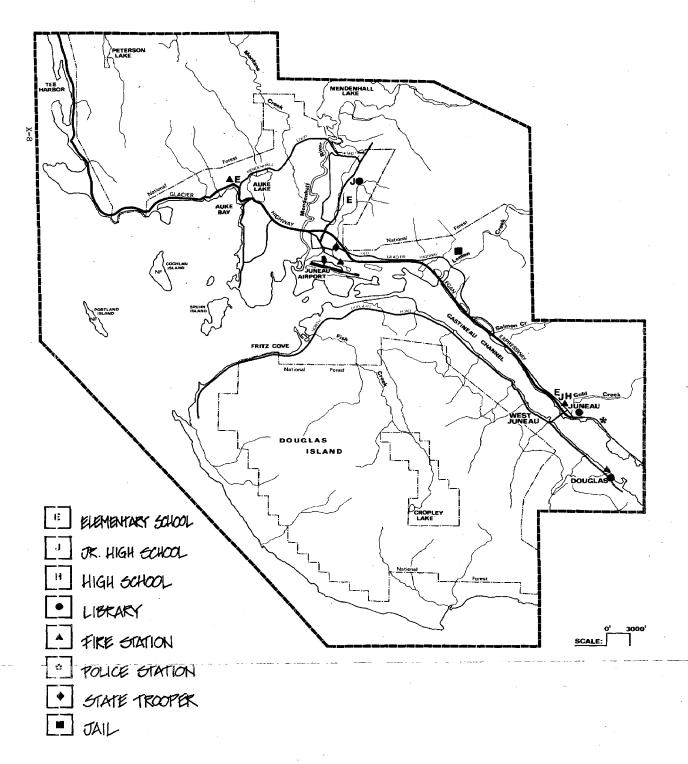
PARKS, RECREATION, AND OPEN SPACE

Type and Location

The Department of Parks and Recreation administers a system of neighborhood, community, and urban/borough parks throughout the CBJ. Also included in the system are trails, bike paths, and special recreational facilities such as the Augustus Brown Swimming Pool, Mount Jumbo Gym, the Last Chance Basin Historic District/Mining Museum, and Eaglecrest Ski Area. Additional recreation sites are provided within the CBJ by the State of Alaska and the U.S. Forest Service. A list of sites and facilities is provided in Table X-3.

FOCUS AREA

PUBLIC FACILITIES & SERVICES



Full-size copies of this map are available at the CBJ Planning Department.

COMPREHENSIVE PLAN FOR THE CITY & BOROUGH OF JUNEAU, ALASKA

COGAN/SHAPIRO Consultants in Planning • Public Affairs • Environmental Science

Juneau, Portland, Seartle

TABLE X-3

JUNEAU PARK/RECREATION LAND AND FACILITIES

	Ownership	Acres
NEIGHBORHOOD PARK LAND		
Developed or Under Development Adair/Kennedy Memorial Park Auke Bay Playground Capital Playground Cathedral Park Cedar Park Chicken Yard Park Cope Park Douglas Mini Park Gastineau Playground Glacier Valley Playground Harborview Playground Marine Park Melvin Park Mendenhaven Mini Park Savikko Recreation Area* Switzer Creek Park* Twin Lakes Recreation Area* Windsor Mini Park	CBJ	3.0 2.0 .5 .1 1.5 .2 5.0 .2 1.2 4.0 2.0 2.0 2.5 1.0 3.0 5.0 5.0
<u>Undeveloped</u> Bus Bark Park Lena Park	CBJ CBJ	33.5 4.0 8.0
COMMUNITY PARK LAND		
Developed or Under Development Adair/Kennedy Community Park** Melvin Park** Savikko Recreation Area**	CBJ CBJ CBJ	15.6 5.0 12.0 32.6
URBAN/BOROUGH PARK LAND		
Urban ParkLand Brotherhood Park Savikko Recreation Area (sandy Switzer Creek Park*** Twin Lakes Recreation Area	beach) ***	36.0 28.0 15.0 5.0 84.0
Borough Park Land Auke Village Picnic Area Eagle Beach Picnic Area Fish Creek Park Indian Point Park Lena Beach Picnic Area	USFS USFS CBJ/AR CBJ USFS	45.0 10.0 73.0 24.0 30.0 214.0

	Ownership	Acres
MISCELLANEOUS RECREATIONAL FACILITIES		
Fish Creek Winter Sports Area (Including Eaglecrest Skí Area)	СВЈ	7,710
Mendenhall Glacier Recreation Area	USFS	5,660
Mendenhall Wetlands Game Refuge	AK	5,000+
Juneau Trail System Separated Bikepaths Bike Lanes		Miles 101 11 12
Augustus Brown Swimming Pool Mount Jumbo Gym Last Chance Basin Historic	CBJ CBJ	
District/Mining Museum	CBJ	
5 Public Boat Launch Ramps	CBJ	
4 Public Marinas	CBJ	
Small Miscellaneous Open Space		14.2 Acres

1

CBJ: City and Borough of Juneau AK: State of Alaska

USFS: United States Forest Service

^{*}Neighborhood park portion **Community park portion ***Urban park portion

In the last five years, two major planning efforts have focused on parks, recreation, and open space. The Comprehensive Parks and Recreation System Plan, completed in 1977, emphasizes park acquisition and development. The plan has been a basis for the capital improvements program of the CBJ Parks and Recreation Department. The Juneau Area Recreation Plan was completed in June 1982 by the Alaska Department of Natural Resources. The plan is a cooperative effort of the CBJ and state and federal agencies, and includes a detailed analysis of needs and sites for passive and water-oriented recreation.

The major conclusions of the 1977 Plan which relate to this comprehensive plan concern acquisition and development of parks in existing and newly developing areas. These are as follows:

- Development of a neighborhood/community park in the Lemon Creek/Switzer Creek area.
- . Acquisition and development of a community park in the Mendenhall Valley.
- . Acquisition and development of neighborhood parks in newly developing areas.
- . Acquisition and development of a large Borough park (100-200 acres), oriented to salt water recreation.

The plan defines locational criteria and development guidelines for these facilities, and emphasizes the need to plan for joint use by school children and the general public.

The 1982 plan complements the previous work by focusing on water and wilderness oriented passive recreation concerns. Based on responses to a survey and additional analysis, the plan includes final recommendations for designation of sites for coastal access points or corridors. These are listed in Table X-4.

Summary of Findings

- East Mendenhall Valley and Lemon Creek/Switzer Creek lack adequate park facilities.
- . Neighborhood parks should be planned in advance of development; sites should be reserved or acquired.
- . Increased population causes an increasing need for recreation land and facilities. At the same time, resource development activities (i.e., logging and mining), municipal and state land disposals, and corporation land development as the result of the Alaska Native Claims

Table X-4

JUNEAU AREA RECREATION PLAN FINAL RECOMMENDATIONS

Site or Facility Description	Jurisdiction	Method of Implementation
Lynn Canal Recreation Beaches: Amalga Harbor to Eagle River Eagle River to Sunshine Cove Sunshine Cove to N. Bridget Cove N. Douglas Island recreation beach S. Douglas Island recreation beach	USFS/City and Borcovgh of Jumeau; State tidelands	Develop cooperative management agreement for these public lands. Classify State tidelands for public recreation use. Incorporate specific management direction into TLMP, the City and Borowah Comprehensive Plan, and the State tidelands plan.
Channel Islands recreation designation Swansons Harbor recreation designation	USFS; State tidelands	Develop cooperative management agreement for these public lands. Classify State tidelands for public recreation use. Incorporate specific management direction into TMP, and the State tidelands plan.
Mendenhall Peninsula recreation beaches N. Tee Harbor recreation beaches Point Stephens recreation beaches	City and Borough; State tidelands	Include this recreation designation in the City and Borough Comprehensive Plan. Develop cooperative management agreement for these lands and tidelands; classify State tidelands for recreation use.
Oliver Inlet marine park Shelter Island marine park Taku Harbor marine park St. James Bay marine park	State land and tidelands	Establish as units of the State Park System. Classify tidelands for public recreation use
Johnson Creek Park (Douglas Island) Wetland access routes: File Property Johnson Creek	State lands and tidelands	ILMA from State Division of Lands and Water Management to State Division of Parks
Airport Open Space (Duck Creek)	City and Borough of Juneau	Include this open space designation in the City and Borough Comprehensive Plan.
Last Chance and Granite Creek basins; recreation designation	city and Borough of Juneau; State Parks trail	Include this recreation designation in the City and Borough Corprehensive Plan. Develop cooperative management agreement with State Div. of Parks.

Site or Facility Description	Jurisdiction	Wethod of Implementation
SITE DESIGNATIONS (Continued) Spaulding Meadows recreation designation	USFS	Incorporate specific management direction into TLMP
West Mendenhall Valley greenbelt	City and Borough, private	Include this open space designation in the City Comprehensive Plan. Begin negotiations for purchase of easements across private lands.
Echo Cove access	Undecided (in litigation)	Establish public recreation easement (pending outcome of litigation)
SITE AQUISITIONS, NEW FACILITIES Perseverance Trail reconstruction	State Division of Parks	Initiate engineering study, begin work to rebuild trail on a priority basis
Glacier Highway bike path Loop Road bike path N. Douglas highway bike path	State Department of Transportation and Public Facilities (DOT/PF)	Establish priority with DOT/PF highway development schedule
Riverside Drive bike path Stephen Richards Menorial Drive bike path	City and Borough of Juneau	Work through City Parks and Mecreation Department for priority action on these projects
Lynn Canal beach access routes	City and Borough, USFS	For city lands, identify specific sites for recreation easements and include them in the City Comprehensive Plan. On National Forest lands, designate trail sites, place_signs, and establish cooperative maintennee and management agreements with city, state.
Outer Point trail	City and Borough	Reserve public recreation easement along this trail route.
Thane Road R.V. Parking facility (tentative location at 2nd rock dump)	City and Borough	Identify appropriate site; explore feasibility of private operation at that site

Site or Facility Description	Jurisdiction	Method of Implementation
SITE AQUISITIONS, NEW FACILITIES (continued)	·	
Amalga Harbor improvements	City and Borough, State DOT/PF	Use DOT/PF funding to repair existing launch ramp and improve parking lot. Establish priority with City Small Boat Facilities Plan for additional launch ramp space here and at other locations along the east side of the Lyrun Canal
Sawmill Cove boat ramp	USFS, State tidelands	This recommendation is contingent on final approval of the Cowee-Davies timber sale. If the sale proceeds, construct a boat launch ramp in conjunction with road building activities.
South Douglas Island beach trail: Douglas Island to Marmion Island	City and Borough	Reserve public recreation easement along upland portions of this route. Include this easement reservation in the City Comprehensive Plan.
Peterson Creek trail realignment	USFS, City and Borough	Develop cooperative management agreement and reserve trail easement across City and Borough land.
Oliver Inlet tramway reconstruction	USFS, State (tentatively approved)	Rebuild tram to original condition, using volunteer labor and funds provided by the 1982 legislature.
Valley indoor recreational facility Valley ice rink	Unspecified sites	Identify these facilities as priorities for the purpose of the City and Borowth Comprehensive Plan. Work through the City Parks and Recreation Department to identify appropriate sites.
Douglas Highway wayside	Private land	Nork through City Parks and Recreation Department to negotiate for purchase of an appropriate site.

Recommended Action		Reserve public recreation easement (pending outcome of litigation)	Reserve public recreation easement from highway turnout to beach, along the existing trails	Reserve public recreation easement from highway to the beac;, and around the north shore of the salt lake to the beach	Reserve public recreation easement from road south to the beach	Reserve public recreation easement	Reserve public recreation easement, and identify trail corridor from highway to beach	Aguire site and reserve public recreation easement from loop road to Lena Point	Reserve public recreation easement from road to beach	Aquire access to this lot; reserve public recreation easement across city land to beach	Aquire access to city land across land owned by the Coast Guard; reserve public recreation easement from highway to the beach at Indian Point	
Jurisdiction		Undecided	City and Borough	City and Borough	City and Borough	City and Borough	City and Borough, USFS	Private	City and Borough	City and Borough	City and Borough, Coast Guard	
Site Location	COASTAL ACCESS DESIGNATIONS E. Lynn Canal:	Echo Cove	N. Bridget Cove S. Bridget Cove Sunshine Cove	Peterson Creek vicinity	Amalga Harbor	Tee Harbor, Lot 1A, USS 3057	Yankee Cove vicinity Pearl Harbor vicinity Shrine beach vicinity	Lena Point	Lena Beach: public lands in USS 3053, 3054, 2009	Mile 15%, Lot 10A, USS 3051	Auke Bay Vicinity: Indian Point	

Site Location	Jurisdiction	Recommended Action
Auke Bay vicinity (Continued)		
Auke Creek	City, State, private	Reserve public recreation easement from highway to beach
Ann Coleman Road Fritz Cove Road	City, State	Reserve public recreation easement from the end of these roads to the beach
Airport vicinity	City	Reserve public recreation easement along Duck Creek to the Mendenhall wetlands
Smith-Honsinger property	private	Aquire borrow pit site; reserve public recreation easement to wetlands
Salmon Creek	City	Reserve public recreation easement along Creek to beach
Thane Road vicinity:	-	Decerve mublic recreation easement
Old Dump site	CIEY	reserve public retreation cuscoment to Gastineau Channel; potential hoaf launch site
End of Thane Road	City, State	Reserve public recreation easement from end of the road to the beach
Douglas Island:	City, State	Reserve public recreation easement
Kowee Creek Lawson Creek Mile 1.5.7		
Mile 5, Lots 80,81 USS 3272 Fish Creek Inner Foint		
Outer Point	City and Borough	Reserve public recreation easement across city land to beaches north of Outer Point

Settlement Act (ANSCA) act to reduct the supply of recreational lands.

- The public supports designation and development of beaches, shorelines, and streamside areas for public use and open space.
- There is a need for more effective management of land use conflicts associated with sites of high recreational value.

DOCKS AND HARBORS

Type and Location

The City and Borough of Juneau administers a system of small boat harbors and other facilities (the downtown ferry terminal, Maribe Park tourist lightering dock, and boat launching ramps). Small boat harbor facilities are also provided by private owners at Auke Bay and Tee Harbor. Additional facilities are planned near Salmon Creek.

Municipal small boat facilities are located at the City Float, Harris Harbor and Aurora Basin (Juneau), Douglas and Auke Bay. A list of public and private small boat facilities is provided in Table X-5.

Summary of Findings

- All municipal small boat facilities are operating considerably above capacity and there is a long waiting list for permanent stalls. Residents report a great need for additional boat ramps.
- . The CBJ is conducting an inventory and future site evaluation study of small boat harbors.
- . Selection of sites for future small boat harbors and boat launch ramps and consideration of upland facilities should be included with studies of harbor facilities.
- Future demand for public harbor facilities in light of changing boating preferences and role of private sector in providing facilities should be assessed.
- Environmental impacts of small boat harbor development should be considered.

TABLE X-5

JUNEAU SMALL BOAT FACILITIES

Facility	<u>Ownership</u>	Capacity	<u>Use</u>
Douglas Harbor & Grid	CBJ	135 Boats	Year-Round
Aurora Harbor & Grid	CBJ	474 Boats	Year-Round
Harris Harbor & Grid	CBJ	314 Boats	Year-Round
City Float	CBJ	350 Feet	Transient
Douglas Cold Storage Dock	CBJ	300 Feet	Transient
Ferry Dock	CBJ	600 Feet	Transient
Juneau Cold Storage Dock	CBJ	600 Feet	Transient
Auke Bay Floats & Crid	CBJ	56 Boats	Transient
Dehart's & Lift	Private	100 Boats	Year-Round
Fisherman's Bend & Lift	Private	180 Boats	Summer
South Tee Harbor Floats	Private	125 Boats	Summer
National Marine Fisheries Svc	NMFS	70 Feet	Transient
National Park Service Float	NPS	60 Feet	Transient
Douglas Ramp	CBJ		Year-Round
North Douglas Ramp	CBJ		Year-Round
Harris Harbor Ramp	СВЈ		Year-Round
Amalga Harbor Ramp	State		Year-Round
Auke Bay Ramp	СВЈ		Year-Round
South Tee Harbor Ramp	Private		Year-Round
Channel Marine Dry Storage	Private		Year-Round
Lemon Creek Dry Storage	Private		Year-Round

There is a waiting list of 207 names for assigned moorage at Douglas, Harris, and Aurora harbors. There are 698 assigned stalls.

PUBLIC SCHOOLS

Type and Location

The CBJ operates a system of public schools which serves the entire area. These are listed in Table X-6 and are shown on Figure X-2.

Other public schools include a community college and the University of Alaska (UAJ) at Auke Bay and Juneau.

UAJ is a regional liberal arts college with a special community component for technical and vocational programs. It also offers graduate programs in education, public administration, business, and fisheries. The Juneau-Douglas Community College Division offers associate degrees and/or certificate programs in business fields, data processing, marine technology, power techology, and woods/construction.

Enrollment at UAJ is currently (1982) 4,056 (842 FTE). Projections by university officials call for an enrollment of 4,681 (1,101 FTE) by 1986. These projections assume a continued lack of student housing which may inhibit enrollment.

Summary of Findings

- Five of the eight public schools were located to serve the concentration of population in Juneau and Douglas. During the last decade, the population has shifted from these areas to the Mendenhall Valley. This has caused excess capacity in Juneau and Douglas elementary and junior high schools and inadequate capacity in the valley. The one high school is reaching its design limit. The CBJ is constructing a new elementary school in the East Valley and additions to Juneau-Douglas High School.
- . Until recently, no formal demographic analysis has been used to forecast future school requirements. A study now under way should provide data and projections which can be useful in forecasting future needs.
- . An additional factor in planning school facilities is the need for coordination of land use planning between the schools and the CBJ, especially in relation to site selection and facilities design. Coordination is also needed between the School District and the CBJ Parks and Recreation Department to plan park facilities which can serve students and the public.
- . The UAJ is planning a significant expansion of the campus to include additional academic buildings and student housing. Presently many classes are held in public school classrooms due to a lack of on-campus facilities. Student

TABLE X-6

JUNEAU PUBLIC SCHOOLS

Type	Location	Capacity	Enrollment
Elementary	-		
Harborview	Juneau	475	470
Capital	Juneau	300	260
Gastineau	Douglas	340	300
Glacier Valley	E. Mendenhall Valley	560	560
Auke Bay	Auke Bay	550	<u> 560</u>
Total Elementary			2,150
Junior High			
Marie Drake	Juneau	450	370
Floyd Dryden	E. Mendenhall Valley	520	<u>520</u>
Total Junior High			890
High School			
Juneau-Douglas	Juneau	900	<u>008</u>
Total High School			800
Other			
Alternative High	School		70
Alternative Jr.	High		12
Project Independ	ence		8

housing is one of the major requirements for accreditation. Sites adjacent to the existing campus, as well as on-campus development, are being studied.

- . The timing and location of future school facilities should be coordinated with the comprehensive plan to assure compatibility with projected land use and growth patterns.
- . Student housing planned by the University of Alaska, Juneau, may result in increased development pressure in the Auke Bay area for suport services, such as restaurants, retail sales, and improved public transportation. Land use designations in this area should consider these factors.
- . The UAJ and the CBJ should plan cooperatively for university expansion.

LIBRARIES

Type and Location

The CBJ operates public libraries in Juneau (Main Branch), Douglas and the Mendenhall Valley. Other facilities include the Alaska State and the University libraries (Table X-7).

TABLE X-7 PUBLIC LIBRARY FACILITIES

<u>Facility</u>	Location	Volumes
Juneau Memorial Library Floyd Dryden Branch Douglas Branch	Juneau E. Mendenhall Valley Douglas	37,467 4,338 7,186
TOTAL		48,991

The State Library is not a public library per se but rather serves state personnel and other state libraries. The UAJ library serves student needs.

A Summary of Findings

A recent study of public library facilities in the CBJ indicates that existing facilities are overcrowded and in need of upgrading, including increased floor area, staff, programs, and collections. A second phase of this study has produced an architectural program for new facilities in Juneau, Douglas, and the Valley.

- The CBJ is proceeding with the first step in implementing the program by evaluating alternative sites for a new downtown main libary. Also being explored is the potential for combining with the University of Anchorage, Juneau, for a single facility.
- . The size of facilities should be related to future growth patterns for each library service area as projected in the comprehensive plan.

PUBLIC HEALTH AND SOCIAL SERVICES

Type and Location

The CBJ is directly responsible for providing several health and social services, and funds additional services through private non-profit agencies. These are listed in Table X-8.

Summary of Findings

- Bartlett Memorial Hospital has a total of 65 patient beds, with a current occupancy rate of approximately 50 percent. Contributing to this relatively low rate is the lack of sufficient medical specialists in Juneau and the tendency of area residents to seek specialized treatment in Seattle hospitals.
- Hospital administrators anticipate greater future need and have been in the process of planning hospital expansion. A ten year master plan recently completed calls for adding 25 to 35 beds by 1990 in an expanded hospital facility on the existing site.
- . Coordination between hospital planning staff and the CBJ should be initiated to assure that future hospital expansion is consistent with land use and transportation plans.
- . The area adjacent to the hospital should be planned for additional medical facilities.
- . Transit and auto access to the hospital require study and coordination with the CBJ.

TABLE X-8
CBJ HEALTH AND SOCIAL SERVICES

Facility/Program Location	Provider	<u>Functions</u>
Bartlett Memorial Hospital (Salmon Creek)	СВЈ	General Hospital
Juneau Regional Rehabilitation Hospital (Salmon Creek)	CBJ	In-patient treatment of alcohol and drug abusers
Alcoholism and Drug Abuse Central Agency	СВЈ	Out-patient treatment of alcohol and drug abusers
Youth Services	CBJ Non-profit Agencies	Counseling, recreation and employment services
Senior Services	Non-profit Agency	Hot lunches; other services
Day Care Assistance	CBJ	Subsidized day care

LAW ENFORCEMENT

Type and Location

The two law enforcement agencies within the CBJ are the CBJ Police Department and the State Police.

The City/Borough Police Department has one station located in downtown Juneau which provides administrative services and dispatches patrols. The department also provides areawide service to municipal property, such as parks and schools, and airport security system.

The remainder of the CBJ is served by the state troopers who have a station (post) in the Mendenhall Valley and a substation in downtown Juneau. The Valley station is responsible for general administration and dispatch services. The substation handles judicial service and state buildings security.

The state operates one jail, the Southern Regional Corrections Institute located in the Lemon Creek area. The facility can accommodate a little over 100 prisoners. CBJ police also use this facility through a lease agreement with the state.

Summary of Findings

- . The City/Borough Police Department has a staff of 36 including 21 commissioned officers; four enforcement agents; one judicial services officer; six dispatchers; and four support staff. The department has 11 patrol cars including a canine van and has requested funds for an additional officer in its proposed 82-83 budget. The existing level of service is approximately 3.2 commissioned officers per 1,000 population; this compares with the National FBI Standard of two officers per 1000 population.
- . The state troopers, Mendenhall Valley Station, have 19 commissioned officers, five clerical staff and 18 cars. The judicial services substation in downtown Juneau, has nine commissioned officers and two support staff. The officer per population ratio is estimated to be about 1.4 for the Mendenhall Valley station.
- Planning for the state troopers is coordinated through the planning staff located in the downtown Juneau. A new Mendenhall Valley station has been recommended.

The Mendenhall Valley station has assigned an officer to work with the CBJ Planning Department to identify potential sites. The plan is to build the facility by the end of the summer of 1983.

- . The relationship of law enforcement to comprehensive planning has focused upon locational criteria of new facilities and proximity of these facilities to future growth areas.
- . The division in the service areas between the CBJ police and the state troopers causes problems in long-range planning and service. The state finds it difficult to serve the area from North and South Douglas to the Mendenhall Valley because officers must travel through the CBJ police service area for access.
- . If substantial growth occurs in North and South Douglas, law enforcement response may not be as quick as in other areas if these problems are not solved.
- . Site acquisition for law enforcement facilities should be coordinated with the CBJ Planning Department.

FIRE SERVICES

Type and Location

The City/Borough of Juneau is served by five fire departments under a Coordinating Fire Chief and linked by mutual aid agreements.

The Juneau Fire Department provides fire fighting to Juneau Service Area No. 1, to Salmon Creek Service Area No. 7 by contract, and by mutual aid agreement to North Douglas Service Area No. 6. It also provides ambulance service to all areas south of the hospital at Salmon Creek.

The Glacier Fire Department provides service to the Juneau Airport and Service Area No. 5. The department also provides ambulance service to all areas north of the hospital at Salmon Creek.

The Douglas Volunteer Fire Department provides fire fighting services to Service Area No. 2 and by contract to North Douglas Service Area No. 6.

The Auke Bay Volunteer Fire Department provides service to the Auke Bay Service Area No. 4.

The Lynn Canal Volunteer Fire Department provides service to the Pt. Lena, Tee Harbor area (Service Area No. 8).

A fire inspector serves the entire area and is responsible for periodic inspection of all large buildings, residential units upon request, and fire prevention education. Areawide ambulance service is provided to the entire CBJ and implemented by the Juneau and Glacier Bay Fire Departments.

The CBJ recently constructed a fire training center located in the Auke Bay fire service area. The center will be used as a southeast Alaska training center by all federal, state, and/or local agencies.

Fire facilities are shown on Figure X-2.

Summary of Findings

- . The CBJ provides funding to each service area based upon its property tax millage rates. In addition, the state provides assistance through its Municipal Services Revenue Sharing Program, administered by the Department of Community and Regional Affairs. The CBJ receives up to 28% of its current budgeted expenditures from the state.
- . The fire training center has no staff costs. Its operations and maintenance is reimbursed to the CBJ through user fees. The ambulance service is administered by the coordinating Fire Chief and funded through the CBJ.
- . Each of the fire departments, except Lynn Canal, is served by a station and fire fighting equipment. All stations except Juneau are equipped with combination pumpers because of the need to carry large supplies of water to serve most of the areas which do not have public water lines. Juneau water is available through fire hydrants.
- Most of the departments have high insurance ratings, typically 8 and above. The higher the rating the worse or lower level of service, and is related to adequate water supplies, access, equipment, staffing, and other factors. Service Area No. 1 within the Juneau Fire Department has the lowest or best insurance rating of 5. Service Area No. 3, which is largely undeveloped and mountainous, has the highest or worst insurance rating of 10. Service Area No. 3 is served under contract by other Departments. Service Area No. 2, within the Douglas Fire Department also has a low or good fire rating of 6.
- . The ambulance service is operated from the Juneau and Glacier Bay Fire Departments with two paid staff each.
- . The Coordinating Chief is responsible for yearly budget planning for all departments. There is little long-term planning. Future plans included in the 1982-83 budget include a new fire hall and equipment for the Douglas Volunteer Fire Department; improvements in water supply for the Auke Bay Fire Department; implementation of a central ambulance and fire dispatch center for Service Areas Nos. 3, 5, and 8 and the Glacier Fire station; and a single emergency phone number.

- Other plans relate to increased fire training, public awareness programs, and fire plans for public buildings and multiple dwelling units.
- . Areas with water supply problems include the Mendenhall Valley and North Douglas. The designation of growth areas in the Comprehensive Plan should recognize the availability of water for fire protection as well as other factors such as slope and accessiblity.
- . If possible, buildings should be located in gently sloping areas because steeply sloped icy streets inhibit fire protection access.

ELECTRICITY

Type and Location

The City/Borough of Juneau is served by two private Utility systems--Alaska Electric Light and Power (AEL&P) and Glacier Highway Electric Association (GHEA). The AEL&P serves the area from the East Mendenhall Valley, including Juneau and Douglas, southeast to Sheep Creek. The GHEA service area includes the area west of the Mendenhall River and north to the Eagle River.

The federal Alaska Power Administration (APA) owns and operates the Snettisham Power Plant at Crater Lake approximately 40 miles southeast of Juneau. The power from this plant is purchased by both public utilities.

Summary of Findings

- . AEL&P rates are regulated by the Alaska State Public Utility Commission. The GHEA is a cooperative not under the jurisdiction of the Commission. Both utilities are responsible for maintaining and operating transmission lines, substations, and all other electric facilities.
- . The Alaska Power Administration is a division of the federal Department of Energy and is responsible for operation and maintenance of the Snettisham Power Plant and all transmission lines from the plant to the Thane substation.
- . Both private utilities are funded by user fees and state share revenues, and purchase power from the Alaska Power Administration. The GHEA pays a user fee to AEL&P to transmit power to the valley through AEL&P's lines.
- The state also provides some monies to local governments for capital facilities. These are appropriated through the Alaska Power Authority.

- The AEL&P purchases most of its power from the Snettisham plant which has a peak capacity of 47.1 MW. AEL&P's winter peak load was about 30 MW in 1980-81. In addition to this power, AEL&P produces firm and standby power from its own hydroelectric diesel and gas turbine generators located at Annex, Lower Salmon, upper Salmon, Gold, and Lemon Creeks. Gold Creek diesel and both Lemon Creek generators are used for standby only. AEL&P's firm hydro sources are 6.5 MW from these plants; combined with APA's capacity of 47.1, this results in a firm capacity of about 53.6 MW. Present power sources appear adequate in light of planned and continued upgrading. There are frequent outages caused by storms, trees, and other natural causes.
- . The GHEA purchases all its power from the APA. The utility operates one substation and one single radial distribution system. Its standby diesel generating unit is located at Lemon Creek and is part of a larger standby facility owned by AEL&P.
- The Valley has grown very quickly in recent years, and the existing system has not kept pace. As a result, the utility is operating over capacity and has frequent outages. Both utilities have current long-term plans to upgrade and expand their facilities—AEL&P is upgrading 2.4 KU and 4.16 KU distribution feeders to 12.5Y/7.2KV, and should meet load requirements well into the future. Plans for upgrading substation transformers include Capital Avenue, Gold Creek, Lower Salmon Creek, airport substation, Lemon Creek, and Douglas.
- . The GHEA general utility plan recommends that the district require rights-of-way for future transmission lines and substations, aggressively seek ways to reduce the number and duration of customer outages, and improve reliability of power from APA. Specific long-range capital improvements include a new radial 69-KV transmission circuit to supply all GHEA substations rather than a loop-fed, multicircuit system and standardization of substation transformer sizes at 5.0/6.25 MVA and 7.5/9.375 MVA units.
- . The Alaska Power Administration is upgrading the Snettisham hydroelectric plant from the 47.1 MW peak capacity to 73 MW peak capacity, and expects to be completed by 1986. This is anticipated to provide an adequate supply to AEL&P and GHEA for future needs. The administration has completed a feasibility study and a power market analysis on the Hoonah power project to run transmission lines from Juneau to Hoonah across North Douglas Island and under water to Admiralty Island, but does not have funding at this time. If the line is built, it would bring electrical power to North Douglas which is presently undeveloped and without power.

- Both public utilities serve new developments. Unfortunately, in areas such as the Mendenhall Valley outages occur because the sources of supply and transmission have not been expanded and updated to meet new customers' needs.
- . The Alaska Power Authority and the Juneau Planning Department should coordinate in regard to the North Douglas plan relative to potential development patterns on the island. Future development should respond to the Comprehensive Plan.

Section XI

Transportation

XI. TRANSPORTATION

INTRODUCTION

This section describes the existing transportation networks in the southeast Alaska region generally and the Juneau area specifically; and identifies local transportation problems, issues, and future demand for facilities.

The information presented below is derived from available state and borough reports. A list of references is included in Section XII.

REGIONAL TRANSPORTATION SYSTEM

The basis for this description of the regional transportation system is the Southeastern Alaska Transportation Study and Plan, adopted by the State of Alaska Department of Transportation and Public Facilities in June 1980. The data was collected in 1976-1979.

As illustrated in Figure XI-1, the Southeastern Alaska region stretches nearly 600 miles from the southern tip of the panhandle at Dixon Entrance to the Fairweather Range in the north. The predominant transportation modes in the region are by air and sea; by the late 1970's, over 1 million passengers and 6 million tons of commercial freight were carried into and within the region in this manner. Due to the rugged topography and wide separation of inhabited areas, land transportation is confined primarily to road systems within each community, with the exception of three highway and one rail links to the Alaska-Canadian Highway in the Canadian interior. A detailed discussion of each transportation mode follows.

AIR

This service has developed rapidly within the last three decades to serve growing demand. By 1977, airplanes carried over one half of the region's passenger traffic, although only 2% of the total freight. Inter and intra-regional air routes are illustrated in Figure XI-2.

Alaska Airlines provides daily jet service from Anchorage and Seattle to Ketchikan, Petersburg, Wrangell, Sitka, Juneau, and Yakutat, with additional summer service to Gustavus. A second air carrier, Wien Air Alaska, recently discontinued service to the panhandle.

Figure XI-1
STUDY AREA AND POPULATION CENTERS

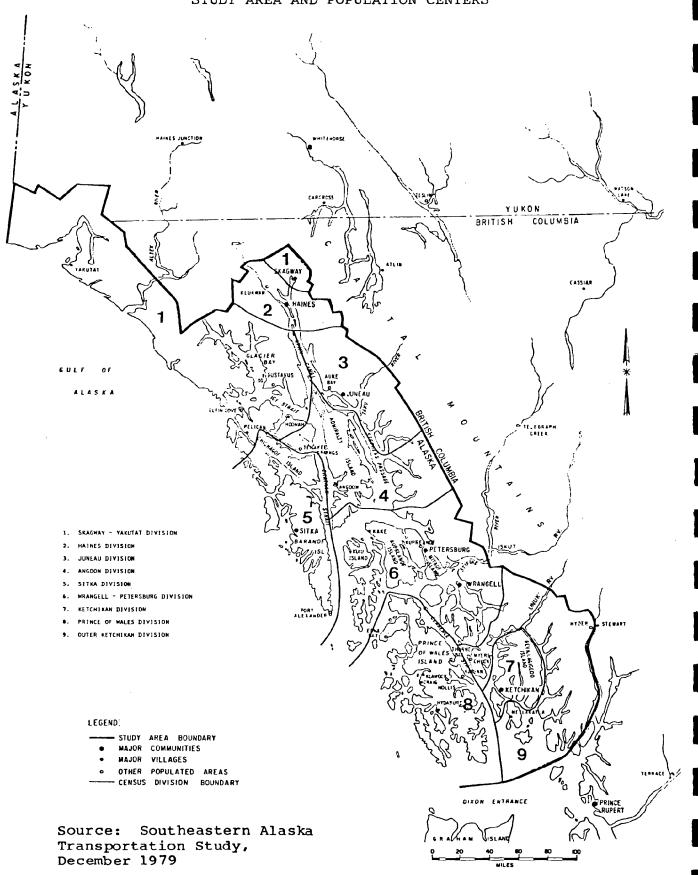
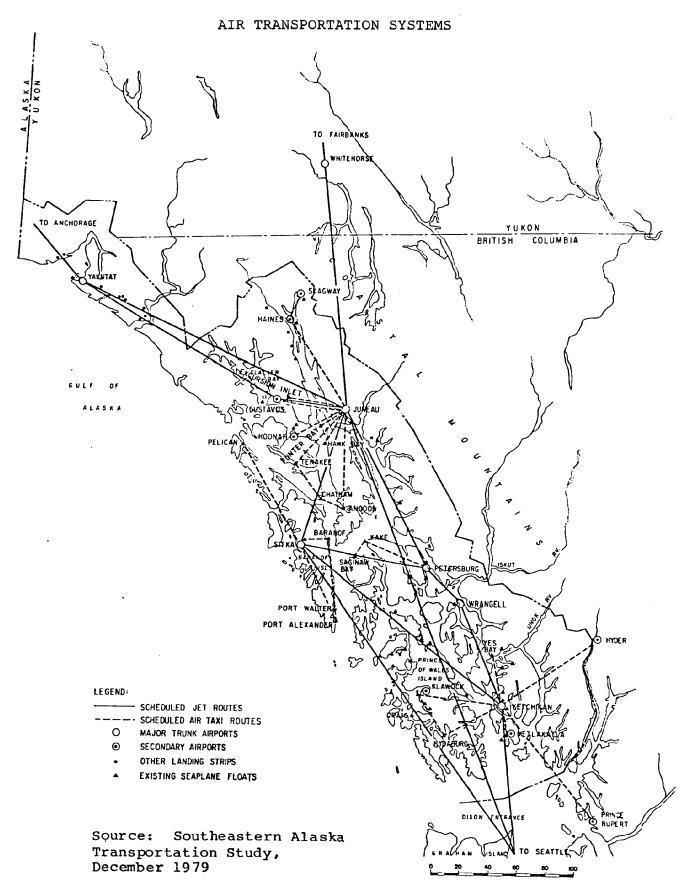


Figure XI-2



Air taxi and helicopter services account for approximately 1/3 of the total air traffic in the region, and provide scheduled passenger and mail as well as on-call service to smaller communities. Individual air taxis generally operate within a specific service area, and many specialize in serving a particular segment of demand, such as logging camps, recreational facilities, or travel between specific communities. Small communities which do not have land based airport facilities utilize float plane service.

Eight airports in the region can accommodate jet aircraft; the Juneau, Ketchikan, and Yakutat facilities have runways of sufficient length to accommodate all but jumbo class aircraft. Approximately 70% of the nearly 125 air terminals identified in the region accommodate seaplanes; two city-owned facilities are located in Juneau. Characteristics of the region's major and secondary airports are summarized in Table XI-1.

MARINE

Despite the rapid growth in air traffic, marine remains the major transportation mode in southeastern Alaska. In 1978, it accounted for 48 percent of passenger, 79 percent of vehicle, and 98 percent of freight traffic. The State of Alaska owns and operates the Marine Highway System comprising four main and three feeder ferry routes (Figure XI-3). Car ferries on the mainline routes serve all major communities in the region as well as the ports of Seattle, Washington and Prince Rupert, British Columbia. The location and characteristics of the region's ferry terminals are detailed in Table XI-2.

During the peak summer season, two vessels each operate on the SeattleSkagway and Prince Rupert-Skagway routes, providing six ferry trips per week for most intermediate communities. Three feeder ferries provide service to smaller communities one and four times weekly. During the winter season, the same routes are utilized, but with reduced frequency. There is a marked seasonal variation in use.

The Southeastern Alaska Transportation Study utilizes two growth rates to project year 2000 marine traffic demand. A higher growth rate extrapolated from past trends indicates a severe shortage of vehicle capacity by 1983; vehicle capacity on the Seattle-Ketchikan link was reached in the late 1970s. Passenger capacity is anticipated to be adequate until after 1990. If ferry travel demand is projected at a low growth rate, passenger and vehicle capacity are adequate for another decade. Traffic demand predictions depend on variables such as the region's population growth, tourism*, the local and national economies, and fuel and other operational costs.

^{*} Tourists comprise 75% to 85% of summer ferry traffic.

Table XI-1

EXISTING AIRPORTS AND LANDING STRIPS IN SOUTHEASTERN ALASKA

	nt.					ഗ	ທ				Ø			ഗ ഗ	
	Maint.	NO	S S	N _O	NO	Yes	Yes	8	S S	N _O	Yes	8	No	Yes	
	Services Fuel Main	NO	O O	NO	N _O	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	
BUCCH	Tower	NO	N N O O	No	No	No	Yes	N _O	No	No	No	No	No	NO NO	
מססווומטים דרותו	Term. Bldg.	NO N	N O	No	No	No	Yes	Yes	No	Yes	Yes	NO	Yes	Yes	
	Taxi Ways	No	Yes	NO	No	N _O	Yes	Yes	No	No	Yes	No	No	Yes	
NT CITYIO	Surface Type	Asph.	Asph. Asph.	Asph/Grav	Grav.	Grav.	Asph.	Asph.	Grav.	Grav.	Asph.	Ash-Imp	Asph.	Conc. Conc.	
המודקונים	Width (ft)	150	300	100	100	100	150	150	100	152	150	20	150	150 150	
	Length (ft)	7500	5000	4602	2800	3600	8456	7500	2500	0009	6500	3300	0009	7747 7813	
EALSTING RINFONIS AND	Runway Heading	12-30	1-19 $10-28$	8-26	5-23	18-36	8-26	11-29	1-19	4-22	11-29	1-19	9-27	11-29 2-20	
TOTOT	Owner	Reserv.	State	State	State	Prov.	City	State	State	State	State	State	State	State	
	Community Served	*Annette	*Gustavus	Haines	Hoonah	Hyder (3)	*Juneau	*Ketchikan	Klawock	*Petersburg	*Sitka	Skagway	*Wrangell	*Yakutat	

* Can accommodate jet aircraft.

Source: Southeastern Alaska Transportation Study, December 1979.

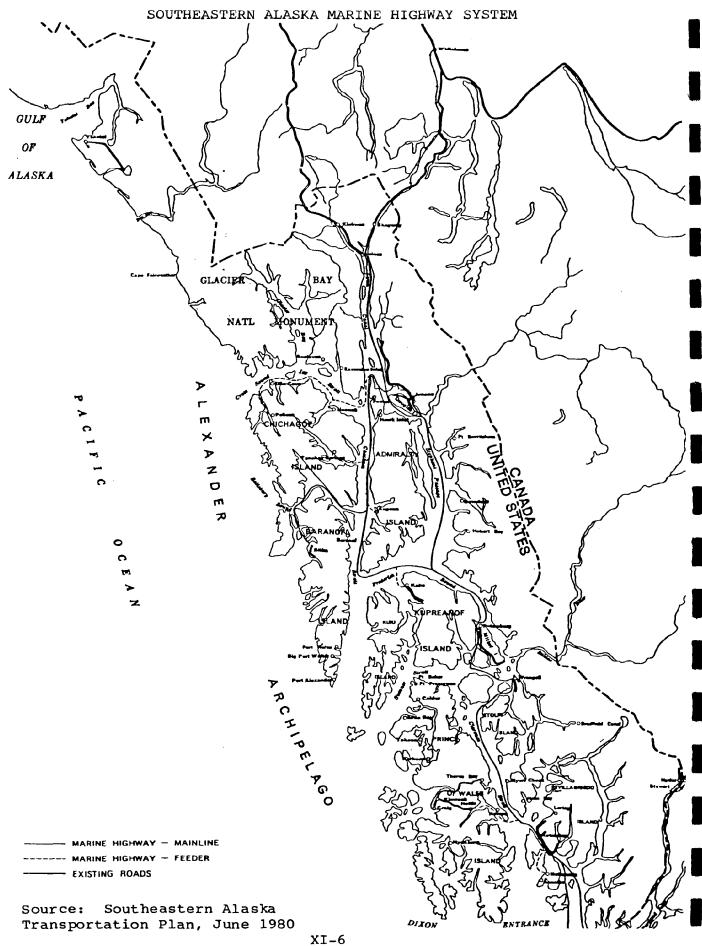


Table XI-2

FERRY TERMINALS IN SOUTHEASTERN ALASKA REGION

Community	Ramp Type	Loading Type	Ramp Capacity	Water Depth at Face	Terminal Building	Dock Condition	Comments
Angoon	Floating Ramp	End	(tons) 25	N/A	NO	New	Le Conte Class only
Haines	Adjustable Bridge	Side	35	26'	Yes	рооб	All ferries
Clark Bay	Floating Bridge	Side	N/A	N/A	NO O	New	All ferries
Hoonah	Floating Ramp	Side	35	15'	NO O	Good	Le Conte Class only
Juneau-Auke Bay	Adjustable Bridge	Side	35	201	Yes	Medium	All ferries
Juneau-City	Adjustable Bridge	Side	35	N/A	Yes	Medium	All ferries
Ketchikan-Mainline	Adjustable Bridge	Side	35	20'	Yes	Medium	All ferries
Ketchikan-Shuttle	Adjustable Bridge	End	35		Yes	Medium	Chilkat Class only
Ketchikan-Airport	Adjustable Bridge	End	35		Yes	Medium	Airport shuttle
Kake	Floating Bridge	Side	N/A	30'	NO ON	Good	Le Conte Class only
Metlakatla	Floating Bridge	End	N/A	15'	ON O	Poor	Chilkat Class only

Table XI-2 (cont.)

Source: Southeastern Alaska Transportation Study.

During the summer season, the region is served by more than twelve cruise ships which sail the Inland Passage route. While public ferries carry passengers, vehicles, and some freight, these ships carry passengers only. There also are a number of small boat facilities throughout the region, including six in the Juneau area, which accommodate pleasure craft and fishing vessels (Table XI-3).

A majority of the region's freight is moved by five major marine haulers. Supplemental services are provided by ferries in the Marine Highway System and several private barge operators. Fishing vessels occasionally haul goods into the region. Foss Alaska Line is the largest freight carrier in southeastern Alaska. The company provides weekly barge service from Seattle to major communities, including Ketchikan, Wrangell, Petersburg, Juneau, and Sitka. These regional marine freight routes are illustrated in Figure XI-4.

LAND

There are approximately 600 miles of highway and 20 miles of rail in the southeastern Alaska region, Figure XI-5. State highways comprise about 80% of the total road mileage with the remainder maintained by local cities and boroughs. There are three highway links between the Alaskan panhandle and the Canadian interior. In the south, Hyder, Alaska has access to the intercontinental highway via its 20 mile link with Stewart, British Columbia. In the north, Haines, Alaska is connected by highway to the Alaska-Canadian Highway in northwest Yukon Territory. Skagway, Alaska, and Carcross, Yukon Territory are connected via a new road completed in 1978. All remaining roadways serve intra-community activities.

The region also contains several areas which have well developed networks of logging roads which could be expanded and improved to highway standards; however, such reconstruction often is as expensive as new construction.

The White Pass and Yukon Railroad parallels the Skagway/Carcross Highway and carried nearly 70,000 passengers and approximately 500,000 tons of lead and zinc minerals in 1977. Continued growth of passenger and cargo movements on this line is anticipated.

Table XI-3

SMALL BOAT FACILITIES IN SOUTHEASTERN ALASKA REGION

Community	# of Units	# of Berths	Services/Facilities	Berthing Fee
Angoon	1	50	Fuel	No
Baranof	ī	15	None	No
Craig	3	105	Power, Fuel, Telephone	No
Elfin Cove	2	58	Fuel	No
Funter Bay	ī	4	None	No
Haines	ī	51	Power, Repair, Fuel, Telephone, Restrooms, Launching Ramp	Yes
Hoonah	1	30	Fuel, Telephone	No
Hydaburg	1	20	Fuel	No
Juneau	6	1200	Power, Repair, Fuel, Telephone, Restrooms, Launching Ramp	Yes
Kake	1	15	Repair, Fuel	No
Kassan	1	5	None	No
Ketchikan	4	900	Power, Repair, Fuel, Telephone, Restrooms, Launching Ramp	Yes
Klawock	1	20	Fuel, Telephone	No
Kupreanof	1	5	None	No
Loring	1	5	None	No
Metlakatla	1	60	Fuel, Telephone	No
Myers Chuck	1	10	Fuel, Telephone	No
Pelican	1	45	Fuel, Telephone, Repair	No
Petersburg	2	338	Power, Repair, Fuel, Telephone	Yes
Point Baker	1	10	Power, Fuel, Telephone, Restroom	No
Port Alexander	2	25	Fuel	No
Sitka	3	650	Power, Repair, Fuel, Telephone, Restrooms, Launching Ramp	Yes
Skagway	1	75	Repair, Fuel, Telephone, Launching Ramp	Yes
Taku Harbor	2	70	*	*
Tenakee	1	15	Fuel, Telephone	No
Thorne Bay	1	*	Fuel	*
Wrangell	4	460	Power, Repair, Fuel, Telephone, Restrooms	Yes
Yakutat	1	70	Fuel	No

^{*} Information not available.

Source: Southeastern Alaska Transportation Study.

Figure XI-4

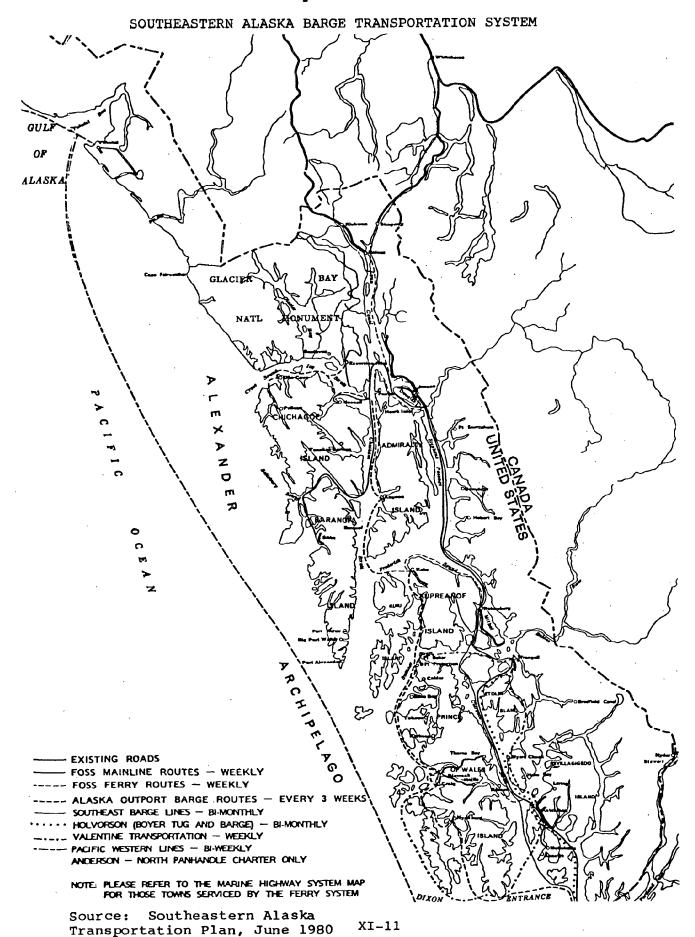


Figure XI-5 LAND TRANSPORTATION SYSTEMS YUKON BRITISH CO COLUMBIA DEASE LAKE ALASKA ELEGRAPH CREEK LEGEND: -- PAVED ROADS -GRAVEL ROADS -----LOGGING ROADS -- - RAILROADS ---- PIPELINES

XI-12

Source: Southeastern Alaska

Transportation Study,

December 1979

Regional Transportation Plan

The State of Alaska Department of Transportation and Public Facilities (DOT-PF) adopted a Southeastern Alaska Transportation Plan in June 1980. It identifies the following principal planning issues and needs:

- Minimize adverse social and environmental impacts associated with transportation improvements;
- Facilitate tourism and industrial development of the region;
- Promote competition between carriers to improve service and decrease fares and tariffs;
- Promote greater service frequency and convenient scheduling;
- Encourage parallel routing of transportation modes to enhance convenience and reliability of regional systems;
- Secure fuel supplies.

The plan also discusses highway, airport, ferry system, and harbor improvement project; several are of concern to Juneau. State planners recommend that serious consideration be given to the construction of a highway link between Juneau and Skagway to provide access to the Alaska-Canadian Highway via Carcross and/or a similar link via the Taku River Valley. The state has authorized funds to improve the roadway access to the Juneau airport.

LOCAL TRANSPORTATION SYSTEMS

ROADWAY SYSTEM

Based on recent studies, the major traffic and circulation problems are two areas of the Borough -- downtown Juneau and the Mendenhall Valley. A discussion of existing conditions and proposed improvements for each follows. Although a study of Douglas Island roadway conditions has not been undertaken, possible improvements in this area are described also.

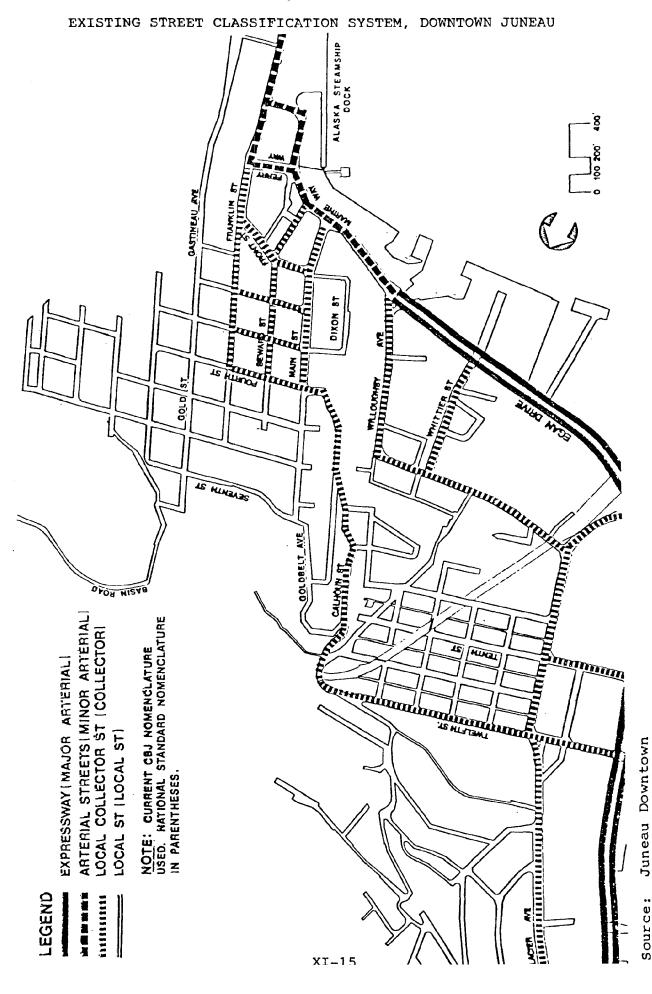
Downtown Juneau

Existing Conditions

According to the <u>Downtown Transportation Plan</u> completed for the City and Borough of Juneau in September 1978, 2 despite relatively low traffic volumes, there are serious vehicular and pedestrian circulation and parking problems in downtown Juneau. Due to topographical constraints and inadequate building setbacks, the existing roadway system is characterized by steep grades and narrow streets and sidewalks. Future street improvements will be very costly, and in some cases not feasible.

The existing street classification system for downtown Juneau is illustrated in Figure XI-6. A majority of vehicles entering and leaving downtown originate in the Mendenhall Valley and Lemon Creek via Egan Drive Expressway or from Douglas Island via Juneau-Douglas Highway and the Gastineau Channel Bridge. Egan Drive provides direct access to the main part of downtown, although vehicles also travel to 12th Street/Calhoun Avenue or Willoughby Avenue. The former provides a "back door" route to the north end of downtown and serves the state office building complex. The latter, located west of the central business district, provides access to the federal office building and the parking facility for the new state office building as well as serving local commercial and retail activities.

In 1977, Egan Drive had traffic volumes ranging from 9,000 vehicles per day (vpd) in the vicinity of Gold Creek to 12,200 vpd at its intersection with Main Street. Approximately 6,700 vpd crossed the Gastineau Channel Bridge. Other principal streets, including Calhoun and Willoughby Avenues, handled between 4,000 and 6,000 vehicles daily.



Source: Juneau Downcown Transportation Plan, Fall 1978

All major downtown streets, with the exception of Willoughby Avenue, have traffic volumes significantly lower than their planned capacity (Table XI-4). Nevertheless, congestion is a serious problem, particularly during the morning (7:30-8 a.m.) and evening (4:30-6 p.m.) rush hours and, to a lesser degree, during the noon hour. Inadequate signing and signalization, utility poles adjacent to rights-of-way, conflicts with on-street loading, and inclement weather, further impair circulation.

Inadequate parking also is a serious problem. Accoring to a 1976 inventory reported in the <u>Downtown Transportation Plan</u>, there were approximately 1,725 parking spaces downtown; nearly 1,000 were located in the central business district. More than 75% of the total spaces were in off-street facilities. At that time, a shortfall of 200 to 300 spaces was identified.

Projected downtown development is likely to exacerbate the parking problem. Although retail development in downtown is expected to be affected by rapid expansion of commercial facilities in outlying areas, significant increases in government employment are anticipated if the capital remains in Juneau. It was estimated in the <u>Downtown Transportation Plan</u> that between 200 and 400 new parking spaces will be required by 1985 to accommodate government employees. In a June 1982 analysis of cost assumptions for retaining Juneau as the capital city, 6 295 parking spaces are projected to serve anticipated growth in state employment and office space by 1994.

When anticipated demand for new parking facilities and a loss of existing spaces during redevelopment are combined with the 1976 shortfall of 200 to 300 spaces, between 600 and 900 additional spaces are required downtown between 1982 and 1994. This does not include the parking spaces for the convention center or additional spaces needed if existing residential areas are redeveloped at higher densities. The CBJ's zoning code requires that adequate parking be provided for such projects.

There also is considerable pedestrian traffic, not only from those who work downtown, but from tourists, especially in the summer. As many as 800 people may disembark at the docks from a single cruise ship or ferry. Three ships may be in port at one time. Some local residents also frequent downtown retail establishments and services.

Table XI-4
SELECTED DOWNTOWN STREET VOLUME/CAPACITY DATA

Street	From	<u>To</u>	Daily Volume (Veh.)	Daily Capacity	Ratio Vol./Cap.
S. Franklin	Study Limit	Admiral Way	3,800	7,000	0.54
S. Franklin	Admiral Way	Front	5,000	8,000	0.63
Franklin	Front	Fourth	1,700	3,500	0.48
Main	Fourth	Marine Way	4,200	10,000	0.42
Seward	Front	Marine Way	2,500	3,500	0.71
Fourth	Franklin	Main	2,800	5,500	0.51
Front	Franklin	Main	2,800	6,000	0.47
Marine Way	Admiral Way	Main	10,800	15,000	0.72
Willoughby	Egan Drive	W. Willoughby	6,800	6,000	1.13
W. Willoughby	Willoughby	Gold Creek	5,800	6,000	0.97
Glacier	Gold Creek	Tenth	7,000	10,000	0.70
Glacier	Tenth	Twelfth	4,900	7,000	0.70
Glacier	Twelfth	Behrends	3,700	8,500	0.44
Calhoun	Main	Eighth	3,900	7,000	0.56
Calhoun	Eighth	Gold Creek	3,900	7,000	0.56
Twelfth	Gold Creek	Glacier	2,800	7,000	0.40
Tenth	Glacier	Egan Drive	4,000	7,000	0.57

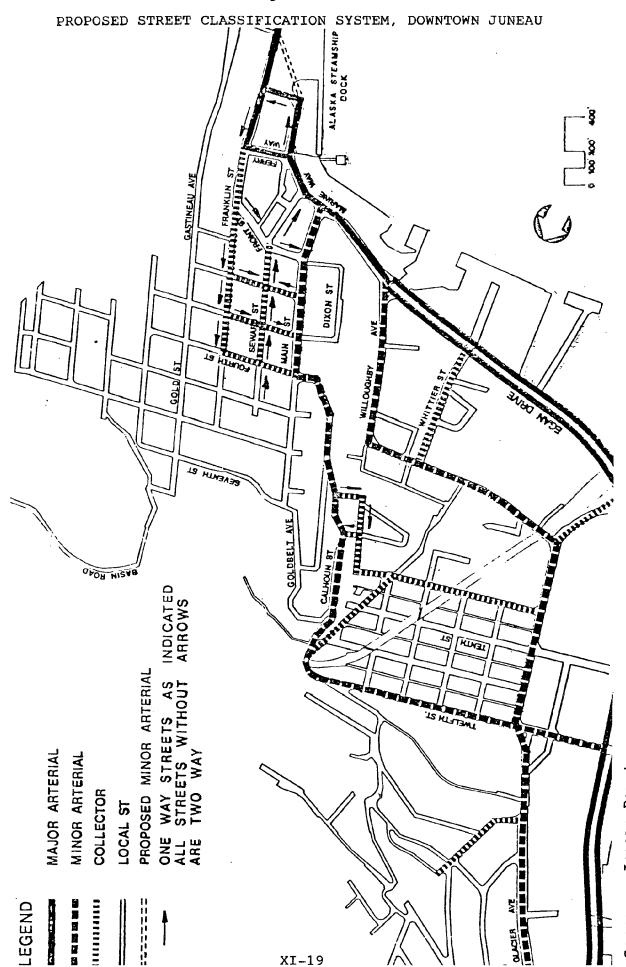
Source: Juneau Downtown Transportation Plan, Fall 1978.

Although sidewalks vary in width between five and six feet, their usable width often is as little as 30 inches because of utility poles and other obstructions. This increases congestion, particularly in the busy commercial areas on Franklin, Seward, and Front Streets. Due to shallow building setbacks, widening the sidewalks is not possible in many Moreover, the hilly terrain inhibits pedestrian access to some portions of downtown, even though more than a mile of stairways has been constructed in rights-of-way which are too steep to accommodate a roadway. These shorten travel distances and add a picturesque, human-scale amenity to the city seldom found elsewhere in the United States. Most of these stairways have been constructed of untreated wood which shortens their useful life and are hazardous The CBJ is undertaking a program to when wet or icy. alleviate these problems.

In the <u>Downtown Transportation Plan</u>, several methods of improving circulation and parking are recommended:

- Implement staggered working hours for government employees. Congestion in the vicinty of the state office building complex could be reduced by one-half during morning and evening rush hours by establishing two employee shifts with 15 minutes between quitting times.
- Adopt new street classification system which incorporates federally-recognized nomenclature; includes 12th Street and the remaining portion of Calhoun Avenue in the state administered Federal Aid Urban (FAU) road system; and deletes 10th Street (Figure XI-7).
- Strictly enforce traffic and parking regulations.
- Monitor traffic conditions on Calhoun and Willoughby Avenues to determine the extent and timing of needed improvements.*
- Replace utility poles with underground utilities. Current conditions obscure motorists' vision and inhibit pedestrian circulation.
- Analyze existing signs and signalizations and identify means to improve traffic circulation and safety.

^{*} Two other recommended projects, the construction of a new channel bridge and improvements to Admiral Way, have been completed by the Alaska Department of Transportation and Public Facilities.



Source: Juneau Downtown Transportation Plan, Fall 1978

- Construct a CBJ owned and operated parking structure primarily for use by downtown employees, in a central location.*
- Reduce traffic into the downtown area by:
 - Improving peak hour express bus service;
 - Constructing new, or utilizing more fully, existing park-and-ride transit parking lots in outlying locations;
 - Providing preferential parking for carpools and vanpools, particularly in the vicinity of government offices.
- Improve downtown pedestrian circulation by exploring a number of options including:
 - Constructing pedestrian malls on portions of major commercial streets;
 - Removing parking and widen portions of Seward, Front, and Franklin Streets;
 - ° Providing street furniture, trees, and other amenities.

Mendenhall Valley

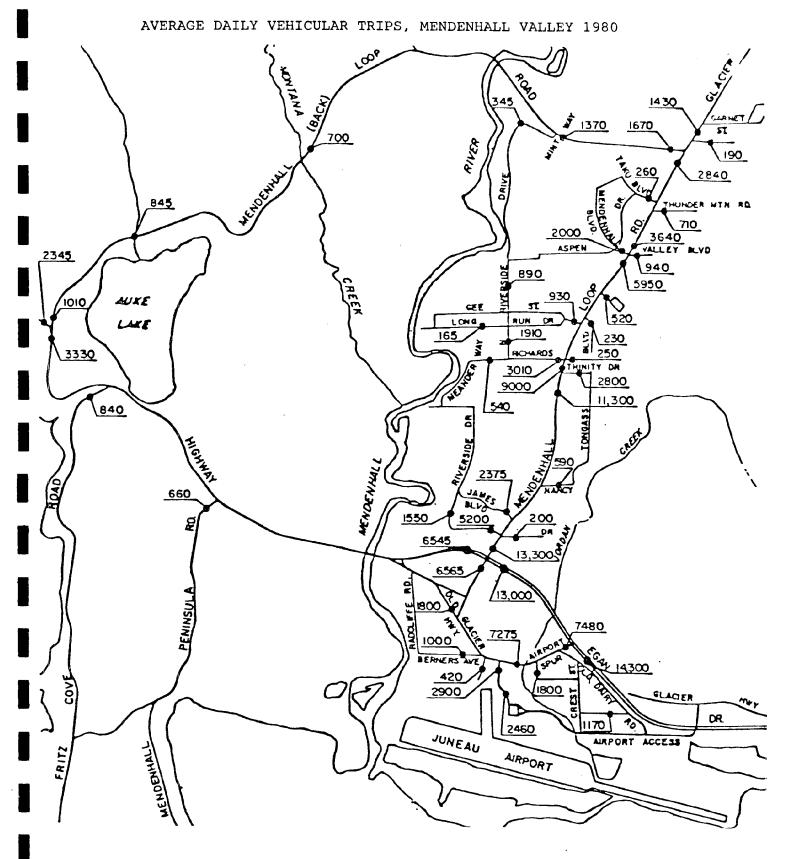
During the past two decades, Mendenhall Valley/Auke Bay has been the most rapidly growing area in the CBJ. Although not adopted by the Borough Assembly, the draft Mendenhall Valley Transportation Plan⁴ identified problems and proposed the following improvements to traffic and circulation.

Existing Conditions

As illustrated in Figure XI-8, Egan Drive and the Mendenhall Loop Road carry 14,300 and 13,300 vehicles daily respectively, and are the most heavily traveled arterials in the area. A secondary route, Old Glacier Highway/Airport Spur Road currently handles about 7,500 vehicles. During the last decade, an average annual increase in traffic volumes of 9% to 10% has resulted in some congestion and delays in access for cars entering these arterials from side streets or driveways, especially during the 4 to 6 pm rush hour.

^{*} The CBJ currently is evaluating proposals for such a facility.

Figure XI-8



Source: Mendenhall Valley
Transportation Plan
(Hearing Draft), 1981.

Vehicular occupancy averages 1.63 persons during peak traffic hours, as compared to an average 1.3 passengers in other urbanized areas. This is attributed in part to the concentration of employment and lack of parking facilities in downtown Juneau and the higher incidence of households with two or more persons working fulltime.

The Capital Transit Company provides bus service between the valley and downtown Juneau. Some additional peak hour service to and from downtown is provided by American Sightseeing. During morning and evening rush hours, many passengers avail themselves of the service, but demand for transit within the valley itself is relatively low.

Population in the Mendenhall Valley by the year 2000 is expected to increase from the current 11,000 to 22,000 people. Most arterials west of the Mendenhall River should be able to accommodate the additional traffic; however, the system east of the river will be overloaded critically if no street improvements are made. As noted in Figure XI-9, year 2000 traffic volumes on Loop Road immediately north of Egan Drive could approach 35,000 vehicles daily with the Old Glacier Highway/Airport Spur route exceeding 15,000 vehicles. By 2000, several other major arterials are expected to approach or exceed their capacity.

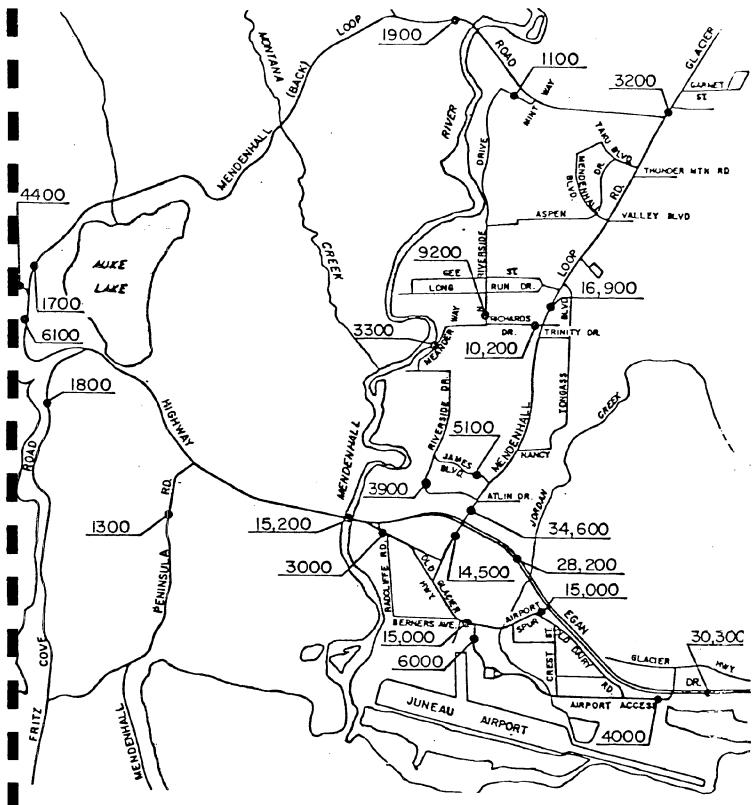
Proposed Improvements

A street improvement program has been adopted by the CBJ, based on recommendations in the Mendenhall Valley Transportation Plan modified by the Planning Commission and Borough Assembly (Figure XI-10). This plan continues the Loop Road as the primary arterial serving the east valley area. Numerous other streets will be developed as minor arterials to ease the flow of traffic. Construction of a new access road to the airport has been completed.

The plan also recommends bicycle and pedestrian improvements to reduce vehicular traffic (Figure XI-11). These include:

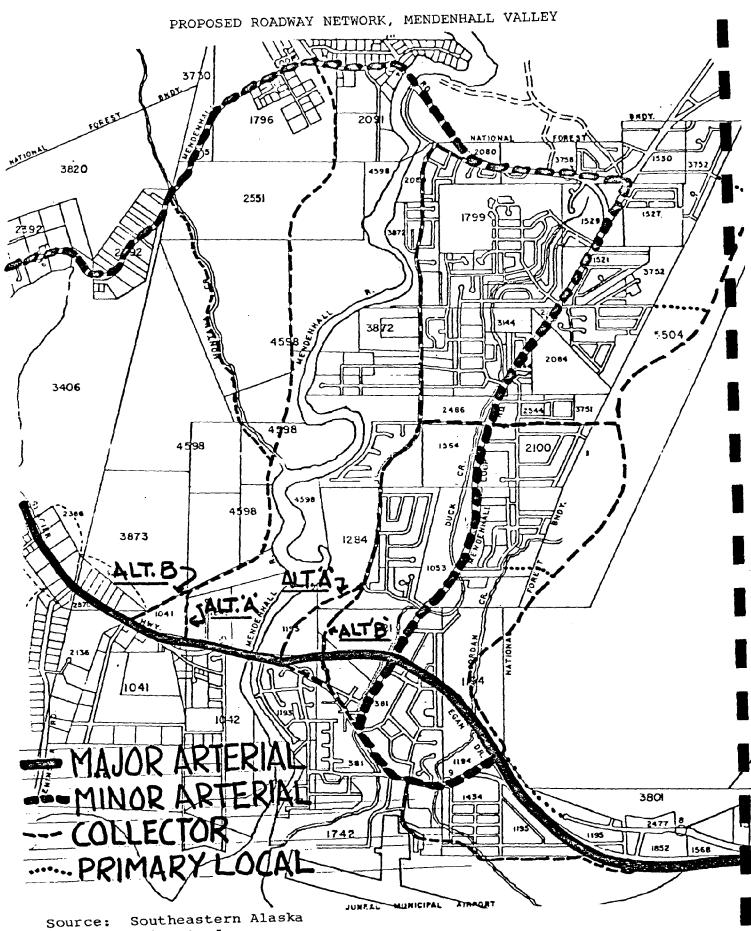
- Physically separated paths for use by pedestrians and bicyclists on Egan Drive and along the west bank of the Mendenhall River;
- Dedicated bicycle lanes adjacent to traffic lanes and/or sidewalks for pedestrian use on portions of Riverside Drive, Old Glacier Highway/Airport Spur, and Mendenhall Loop Road;
- Paved roadway shoulders for bicycle and pedestrian use on Fritz Cove, Mendenhall (Back) Loop, and Radcliffe Roads; Tongass Boulevard, Airport Access, and Berners Avenue.

Figure XI-9
ESTIMATED DAILY VEHICULAR TRIPS WITHOUT ROADWAY IMPROVEMENTS
MENDENHALL VALLEY 2000



Source: Mendenhall Valley Transportation Plan (Hearing Draft), 1981.

Figure XI-10

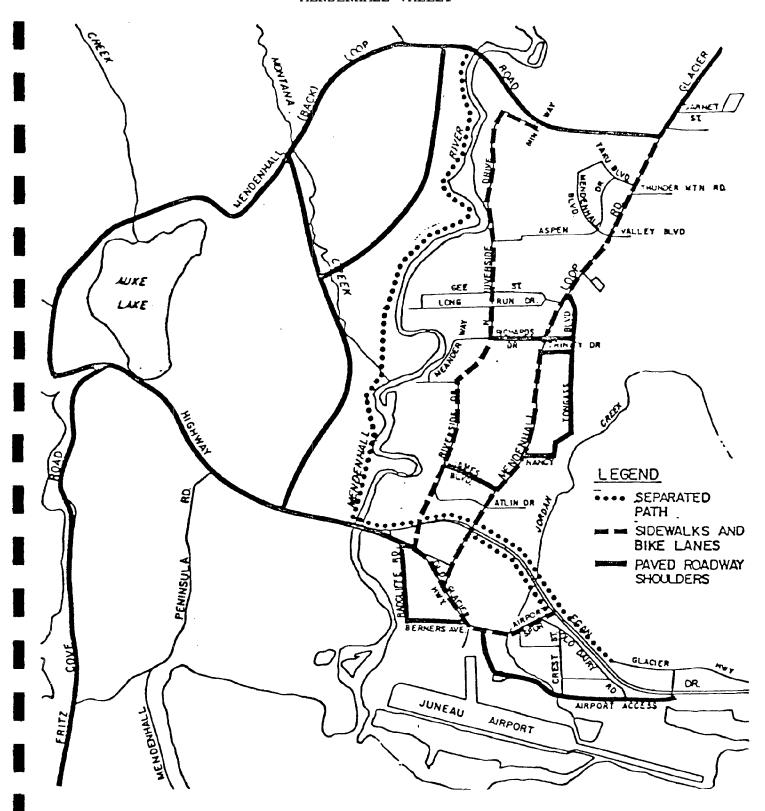


Source: Southeastern Alaska Transportation Study, December 1979 as modified

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Figure XI-11

PROPOSED BICYCLE AND PEDESTRIAN IMPROVEMENTS
MENDENHALL VALLEY



SSource: Mendenhall Valley Transportation Plan (Hearing Draft), 1981.

In addition, a number of recommendations for improving transit service, encouraging car and vanpooling, and initiating flexible working hours are proposed.

Douglas Island

As noted, roadway conditions on Douglas Island have not been studied comprehensively. However, a number of major improvements to facilitate circulation on the island which have been proposed include:

- Extend North Douglas Highway around Outer Point to serve Goldbelt and CBJ properties on the west side of the island, should this area be developed for new growth.
- Widen North Douglas Highway and/or construct a second major roadway (a "bench" road) at a higher level and inland to ease existing and anticipated traffic pressures, especially if North Douglas Island is developed as a new growth area.
- Extend Douglas Highway south from the City of Douglas to serve CBJ selected lands.
- Construct a major roadway link on a causeway across the Gastineau Channel area from approximately the vicinity of the Mendenhall Peninsula to north Douglas Island, if needed to accommodate extensive development.

PUBLIC TRANSIT

Existing Facilities and Service

The publicly owned and operated Capital Transit was established in 1971 with federal Model Cities program funds to provide transportation access to low income, elderly, and handicapped residents of Juneau.

The system serves approximately 1,500 passengers daily, and operates along two main routes — to Douglas Island and the Mendenhall Valley. During peak hours, service is provided within one fourth mile of 88% of the area's households; 85% are served in off-peak hours. Only the North Riverside Drive and the Fritz Cove Road neighborhoods are not covered by the transit system. During the morning and evening peak hours, 8% of the people entering/leaving downtown Juneau use public transit; this is considerably higher than other American communities of similar size.

The fleet includes three 42-passenger buses purchased in 1975 and three used 40-passenger buses added in late 1979. Only one of five minibuses remaining from the beginning is in good operating condition. In 1979, fare box receipts accounted for 25% of the system's budget. Approximately \$300,000 in local revenues were allocated to operations, with the remainder from the federal government. Other transit providers in the CBJ include two cab and two sightseeing bus companies, one of which, American Sightseeing, also has authority to operate limousine and metropolitan bus service. In addition, Catholic Community Services operates free daily van service to its Southeast Nutrition Center.

Plans for Expansion

In its report, <u>Capital Transit Development Program 1980-1984</u>, consultants Peter Eakland and Associates recommend that Juneau undertake the following to improve local transit service:

- Provide additional service to the Mendenhall Valley.
 This includes extending some routes and adding peak hour express buses. Service then would be available within one fourth mile of 93% of the area's households.
- Initiate a vanpool program. Encourage individuals to provide service to remote areas by subsidizing the purchase of 8 to 15 passenger vans with no-interest loans. To qualify, the individual agrees to drive at least eight other commuters to and from work daily. All participants share the expenses, including the repayment of the loan. In off-work hours, the driver may use the van for his own purposes. The CBJ hopes to have five such vanpools in the program within the next few years.
- Coordinate public transit more effectively. Augment services provided by the transit company with other transportation modes. For example, cabs could be authorized on lightly traveled segments of routes and/or during non-peak hours. To accomplish this, the following institutional changes are needed:
 - Enact an ordinance to permit the CBJ to regulate all taxi and bus companies. This would allow it to exercise control over local transportation decisions now under the authority of the Alaska Transportation Commission.
 - Implement a marketing program to increase riders.

Undertake capital improvements.

- o Increase the fleet by purchasing two vans for low density feeder routes; one new 25-passenger bus; and three new 40-passenger buses. Costs are estimated at \$2.93 million, 80% of which may be available from the federal government.*
- Construct new bus shelters and improve signing.
- Build a new garage to store all buses.

As of the time this report was prepared (mid 1982), the CBJ was proceeding to implement the above recommendations of the Capital Transit Development Program.

OTHER MODES

Due to the lack of road connections between Juneau and other regions of the state and Canada, the area is highly dependent upon sea and air transportation. A summary of existing conditions and needed improvements for air and marine facilities follows.

Airport

Juneau International Airport is classified by the Federal Aviation Administration as an S-3, or small hub airport. It is situated on 640 acres on the Gastineau Channel approximately eight miles northwest of downtown Juneau. In 1977, the airport handled 55,300 operations, with general aviation accounting for more than 80%. It can accommodate all but the largest commercial aircraft, i.e. DC-10 and B-747.

According to the 1978 Juneau International Airport Master Plan Study³ prepared by TRA, consultants, commercial air carrier activity is expected to triple to nearly 400,000 passengers by 1997. If the capital is relocated, activity is anticipated to double after a stable period during the 1980s. The number of small planes based at the airport is expected to increase to 250; currently, there is space for 120.

Based on these findings, several deficiencies in airport facilities have been identified:

- Due to the current location of facilities, there is inadequate space for more needed public parking.

^{*} These recommendations were developed prior to the recent cuts in federal funding for mass transit.

- The terminal is poorly designed and too small, causing inefficient operation and passenger inconvenience. There is only one passenger gate. Three are needed now, with a fourth by the end of the century.
- Tie-down areas for small planes are close to capacity. Moreover, they are unpaved and lack access and support facilities. The float plane basin is too shallow and also does not offer support facilities.

To address these concerns, recommendations summarized in Figure XI-13, are proposed in the airport master plan:

- Expand passenger terminal and related facilities, including cargo handling and parking. Some terminal improvements are underway currently.
- Expand and improve land and sea general aviation facilities including hangars and tie-down spaces, fuel stations, and other amenities.
- Construct an internal access road system.

Two other recommendations of the master plan recently have been completed: extension of a taxiway paralleling the main runway, and construction of a new access road to Glacier Highway and Egan Drive.

Figure XI-12

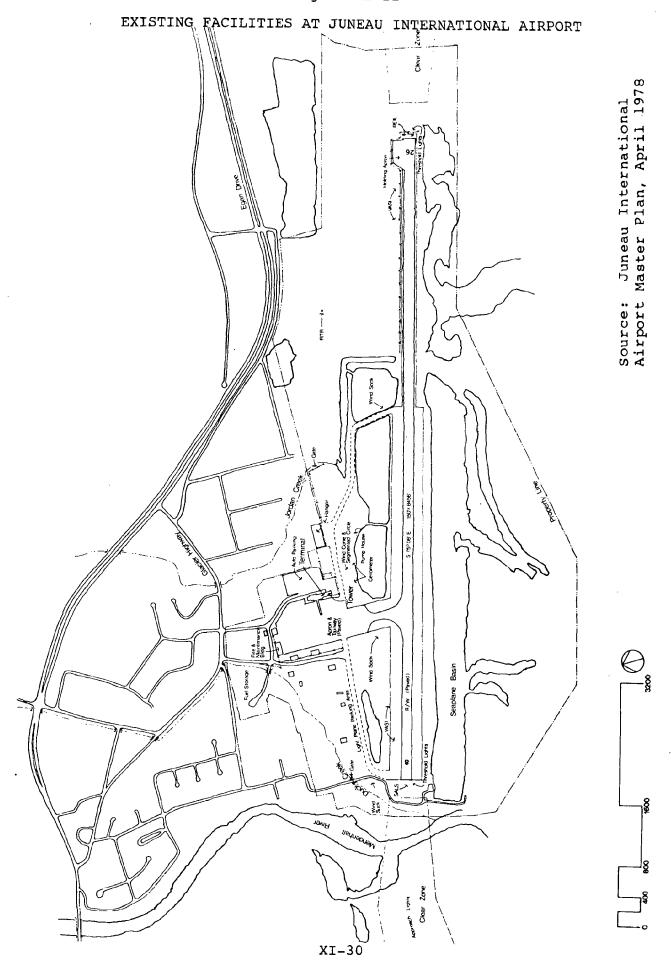
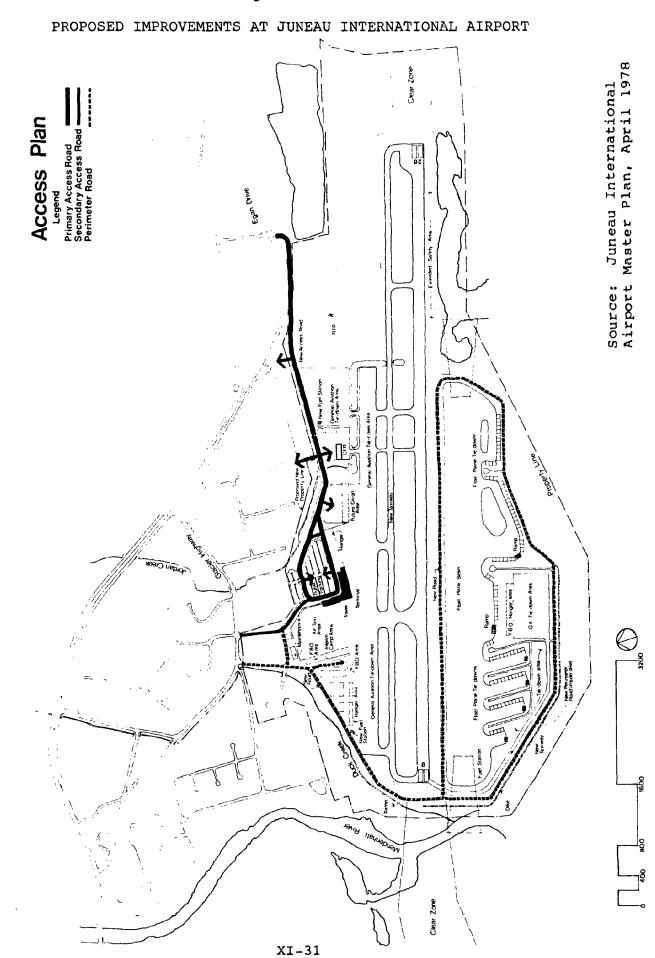


Figure XI-13



Marine

As noted, the State of Alaska owns and operates the Marine Highway Ferry System to transport passengers, vehicles, and freight throughout southeastern Alaska. From two ferry facilities in downtown Juneau and Auke Bay, the system provides service from Juneau to as far south as Prince Rupert and Seattle and northward to Haines and Skagway. The state recently has indicated that it will either improve the downtown Juneau terminal, which is owned and operated by the CBJ, or abandon it in favor of enlarging the Auke Bay facility.

Juneau is a busy port-of-call for cruise ships plying the Inside Passage between May and September, and was visited by 121 ships in 1978. The old Alaska Steamship Dock, which is owned by the CBJ, is the only facility which has been available regularly for cruise ship berthing. However, due to its relatively short length, about 500 feet, it can be used by only small ships. The public dock and ferry terminals are used for larger ships when the state ferries do not dock there. The federally owned Subport wharf also has been used to berth cruise ships in an emergency. As a last resort, ships are anchored in the harbor and passengers ferried to Marine Park.

To accommodate pleasure craft, the City and Borough of Juneau administers a system of small boat harbors and other facilities, including the downtown ferry terminal, Marine Park tourist lightering dock and small boat launching ramps. Private small boat harbor facilities are available at Auke Bay and Tee Harbor. Additional facilities are planned near Salmon Creek.

Municipal small boat facilities are located in Juneau at the City Float, Harris Harbor and Aurora Basin; Douglas and Auke Bay. Their total capacity is 927 permanent berths, plus transient spaces. All of these are considerably above capacity, and there is a long waiting list for permanent stalls. In addition, residents report a need for additional boat ramps.

The City and Borough of Juneau is conducting an inventory of small boat harbors and evaluating future sites.

SUMMARY OF FINDINGS AND ISSUES

AIR AND MARINE

- 1. Due to the lack of road connections between Juneau and other regions of the state and Canada, the CBJ depends heavily upon the air and marine transportation systems which serve the southeast region of Alaska.
- Improvements to Juneau International Airport are necessary to expand its level of service and improve operational safety.
- 3. Detailed studies and planning are needed to assure that future needs of the marine transportation system can be met. This includes not only regional facilities such as the state ferry system, private barge companies, and cruise ships, but small boat moorages as well.
- 4. There is strong local support for increasing ferry service between Juneau and other points in southeastern Alaska in order to expand Juneau's role as a regional center.
- 5. Docking facilities for summer cruise ships are an important part of the local economy and should be expanded and improved.

LAND

- 1. Specific proposals for roadway connections between the borough and other areas of Alaska or Canada include:
 - Highway between Juneau and Skagway.
 - Highway between Juneau and the continental roadway system via the Taku River valley.
 - Improved access to the Haines-Skagway area through a combination of improved ferry service and roads.
- 2. Improvements are needed to correct several major problems in downtown Juneau in order to facilitate traffic circulation, accommodate additional off-street parking, increase mass transit service, and facilitate pedestrian movement.
- 3. During the past two decades, Mendenhall Valley/Auke Bay has been the most rapidly growing area in the CBJ. To ease existing congestion and insure additional capacity for anticipated growth, significant modifications to the roadway system are

required. These include improvement of existing and construction of new arterials and provision of bicycle paths and sidewalks to facilitate pedestrian and bicycle access.

- 4. Major road improvements on Douglas Island could facilitate the movement of traffic between the island and the rest of the borough as well as insure future access to lands on the island which may be developed.
- Juneau's mass transit system is patronized most by state and federal office workers commuting between downtown Juneau and the Mendenhall Valley. However, the system provides only a minor portion of total trips between these areas. A number of recommendations are being considered by the transit system which would improve the quality of service and increase ridership.
- 6. To provide an alternative to use of the automobile, several recommendations to facilitate pedestrian and bicycle traffic in downtown and in the Mendenhall Valley are being explored.
- 7. Sites for future small boat harbors and boat launch ramps should be selected, with consideration given to upland facilities which may be required.
- 8. Future demand for public harbor facilities in light of changing boating preferences and the role of the private sector should be assessed.
- 9. The environmental impacts of small boat harbor development should be considered.
- 10. Improving marine and air transportation facilities is a critical need, due to Juneau's isolation and difficult access to and from other parts of the state and elsewhere.
- 11. The CBJ should integrate roadway improvements with expansion of mass transit, bicycle, and pedestrian facilities, and implementation of other traffic management techniques.
- 12. The most serious local transportation problems in need of immediate attention include:
 - Traffic congestion and lack of off-street parking in the downtown area.
 - Continued growth in the Mendenhall Valley which requires upgrading the existing roadway system and improving mass transit service.
 - Improving dirt and gravel roads up to acceptable urban standards.
 - Providing bicycle paths and sidewalks in areas where such access is most needed.

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